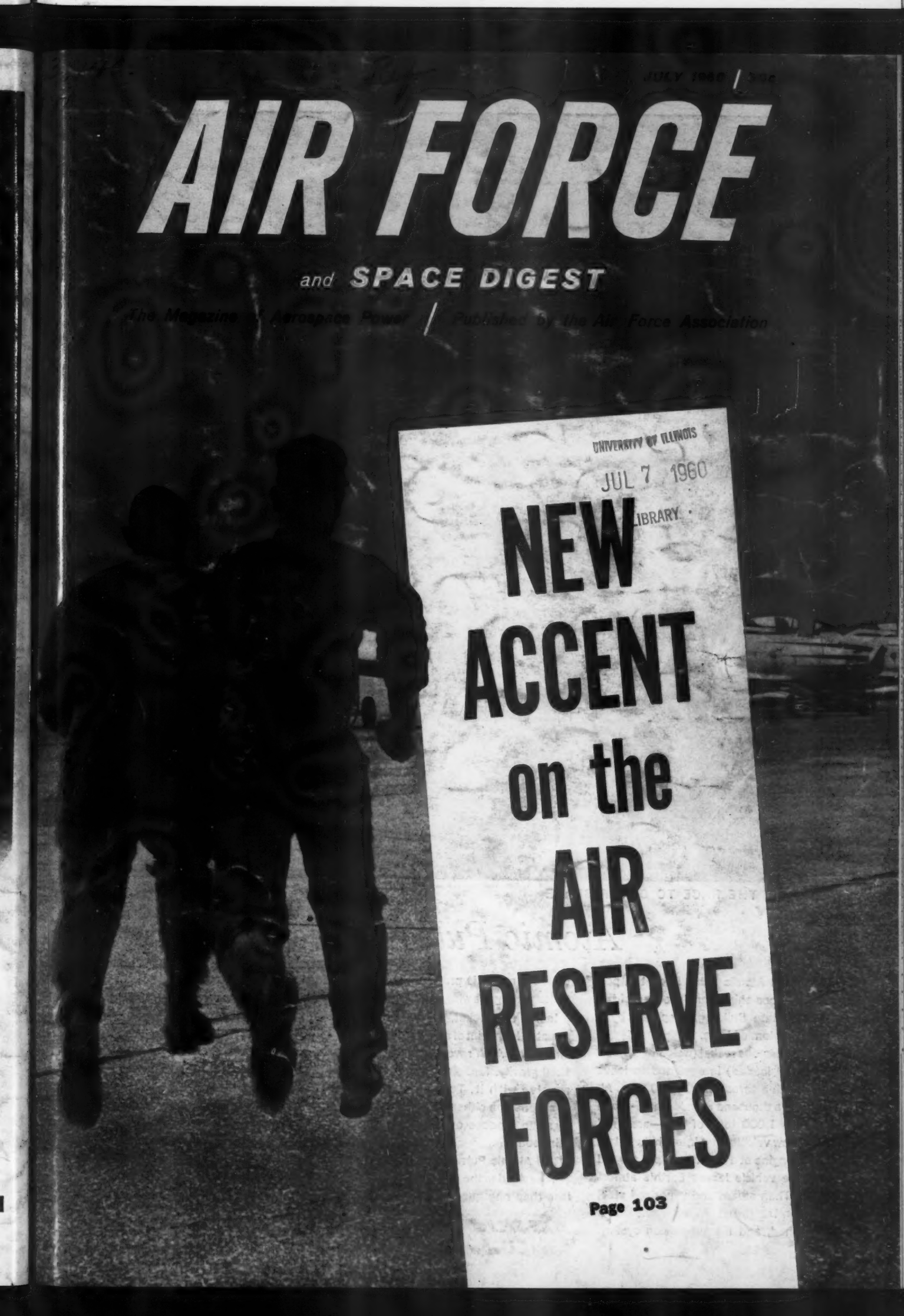
JULY 1960 / 50c

AIR FORCE

and SPACE DIGEST

The Magazine of Aerospace Power / Published by the Air Force Association



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NEW ACCENT on the AIR RESERVE FORCES

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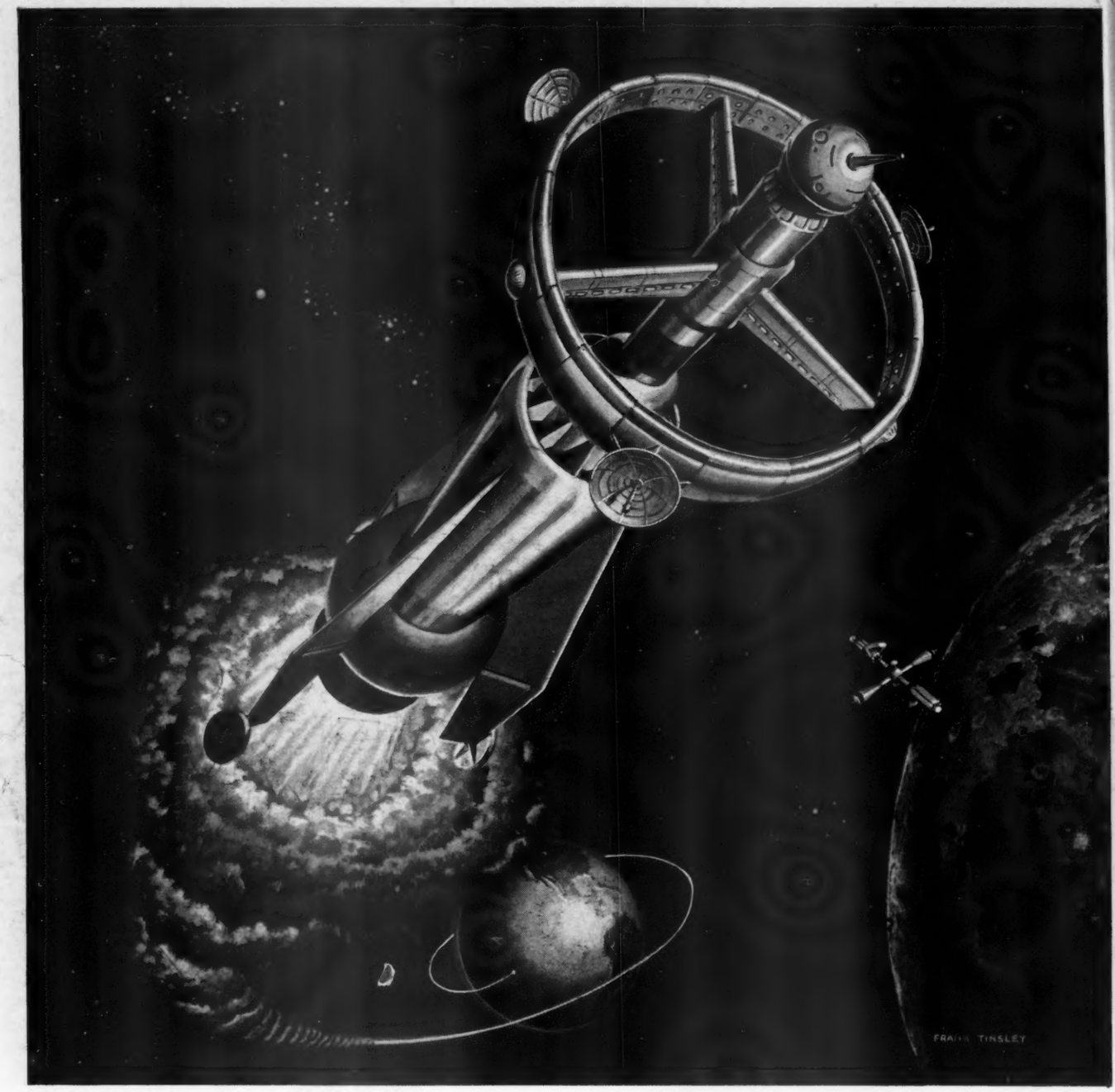

STEPS IN THE RACE TO OUTER SPACE

Atomic Pulse Rocket

This is the Atomic Pulse Rocket, a pot-bellied space ship nearly the size of the Empire State Building, propelled by a series of atomic blasts.

The enormous rocket (weighing 75,000 tons fully loaded) is designed to leave Earth with a thrust of 100,000 tons. Altogether a thousand atomic blasts—each equal to 1,000 tons of TNT—are fired from a low velocity gun into a heavy steel rocket engine at a rate of one per second until the vehicle leaves Earth's atmosphere. Then steam and vaporized steel maintain the thrust. After transit speed is reached, and the propulsion system shut off, power is provided by solar batteries plating the wing and body surfaces.

Inside the rocket, living quarters are situated in the rim of a pressurized wheel-like cabin which revolves to provide artificial gravity. Radio and radar antennae revolve with it. Tubular hydroponic "gardens" on either side of the rim grow algae to produce oxygen and high protein food.

The Atomic Pulse Rocket could transport payload to the Moon at $6.74 per lb., less than one quarter the prevailing air freight charges over equivalent distance.

A similar project is past the pilot-study stage in the Defense Department.

ARMA, now providing the inertial guidance system for the ATLAS ICBM and engaged in advanced research and development, is in the vanguard of the race to outer space. For this effort, ***ARMA*** needs scientists and engineers experienced in astronautics. ***ARMA***, Garden City, New York. A Division of American Bosch Arma Corporation.

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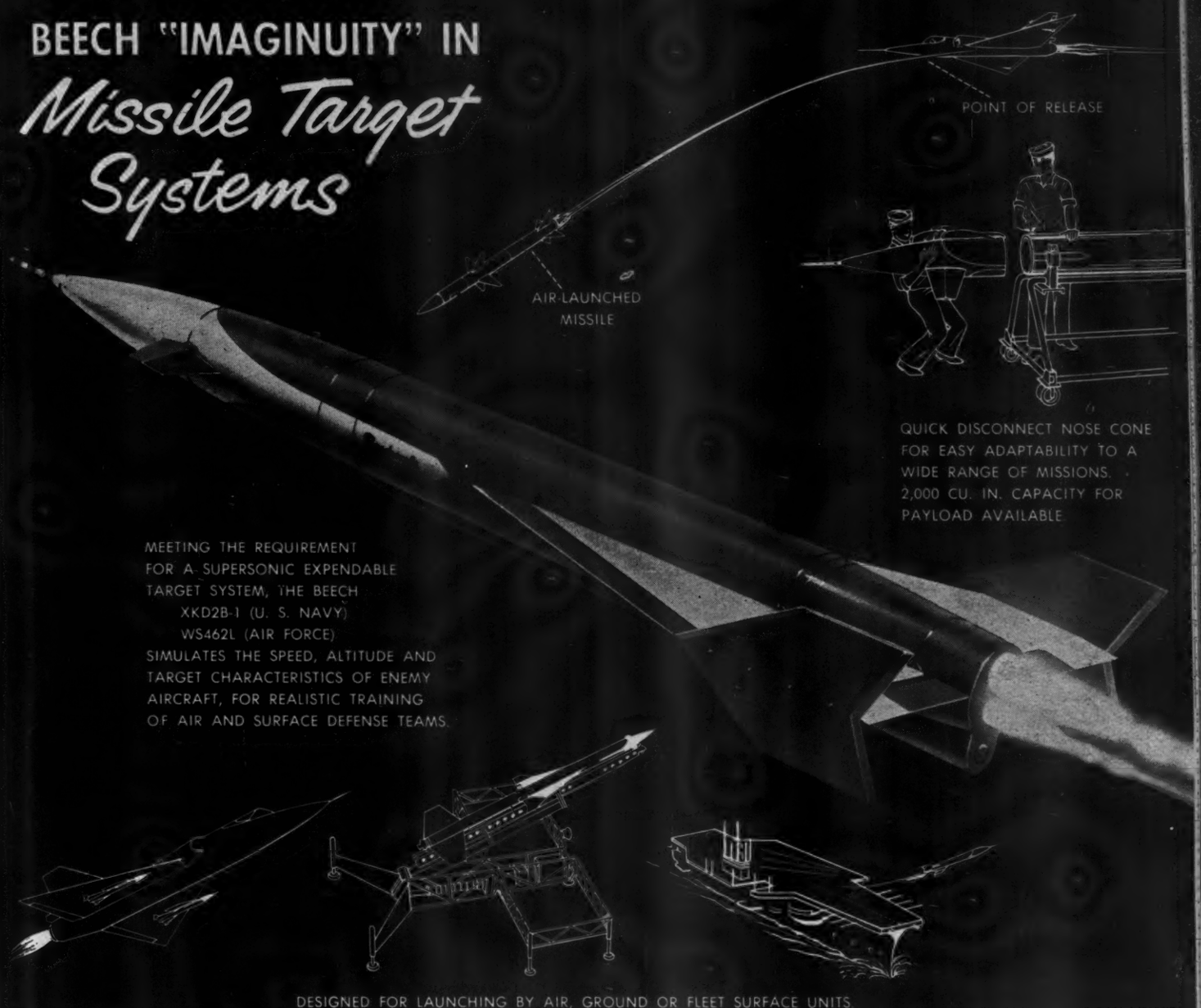
BEECH "IMAGINUITY" IN *Missile Target Systems*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QUICK DISCONNECT NOSE CONE FOR EASY ADAPTABILITY TO A WIDE RANGE OF MISSIONS. 2,000 CU. IN. CAPACITY FOR PAYLOAD AVAILABLE.
MEETING THE REQUIREMENT FOR A SUPERSONIC EXPENDABLE TARGET SYSTEM, THE BEECH XKD2B-1 (U. S. NAVY) WS462L (AIR FORCE) SIMULATES THE SPEED, ALTITUDE AND TARGET CHARACTERISTICS OF ENEMY AIRCRAFT, FOR REALISTIC TRAINING OF AIR AND SURFACE DEFENSE TEAMS.

DESIGNED FOR LAUNCHING BY AIR, GROUND OR FLEET SURFACE UNITS.

Beech XKD2B-1/WS462L: Winner of Navy/Air Force design competition . . .

Mach 2 target system for realistic training born of Beech cryogenic + airframe experience

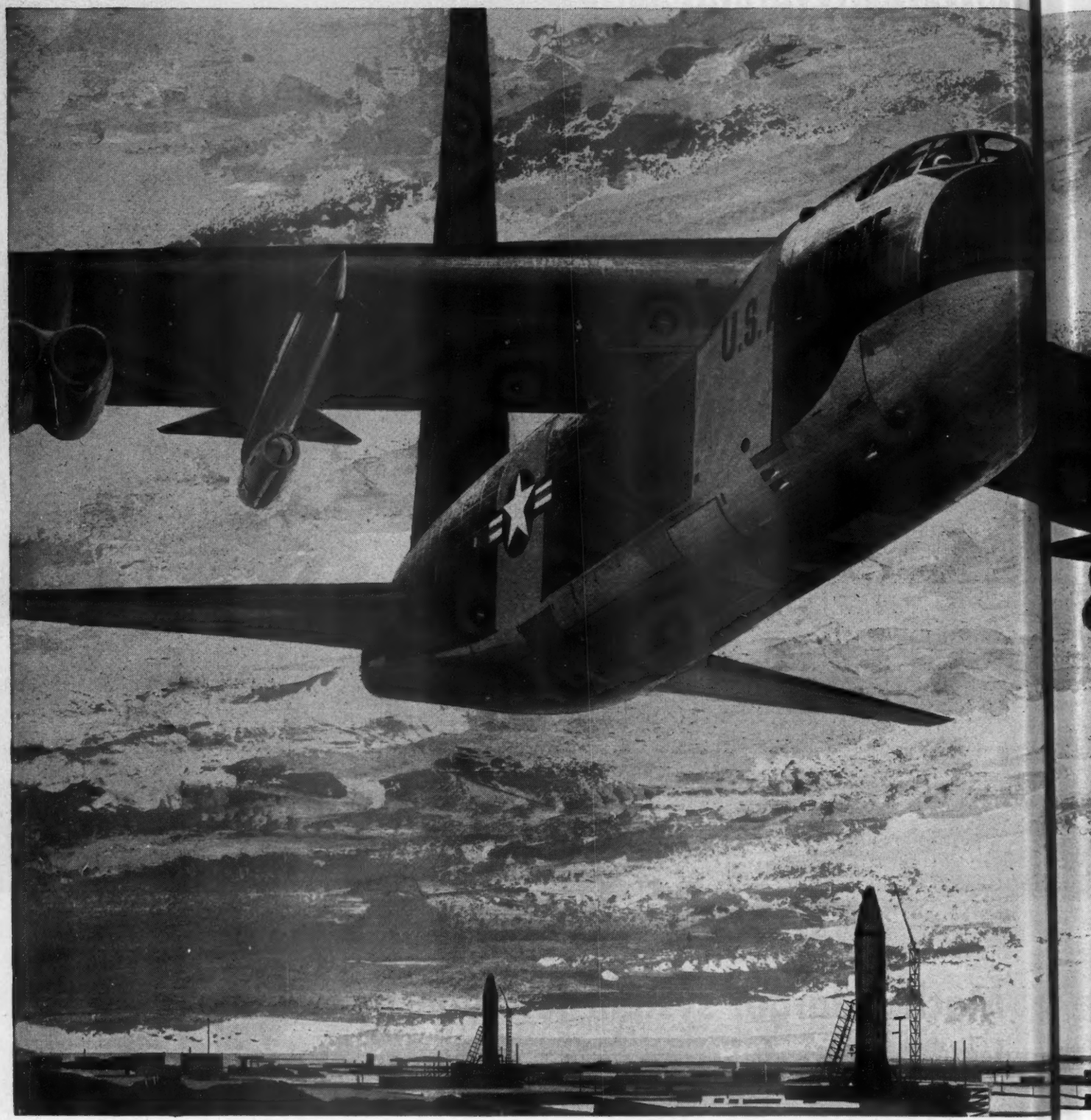
Designed to simulate the speed, altitude and target characteristics of enemy aircraft, the Beech XKD2B-1/WS462L makes possible effective testing of advanced weapons systems and provides realistic training—at low cost—of air, ground and fleet defense units. Into its development has gone more than 6 years of Beech experience in cryogenics, plus over 27 years of airframe know-how. With its pre-programmed guidance system, it operates at altitudes from 1,000 to 70,000 feet and at speeds up to Mach 2. Adaptable for use with Nike, Terrier and Talos launchers, the Beech XKD2B-1 has promising potential for economical development as a missile system. It can carry a substantial payload, to fulfill a wide range of future missions.

Beech *Aerospace Division*

BEECH AIRCRAFT CORPORATION • WICHITA 1, KANSAS,

Beech Aerospace Division projects include R&D on manned aircraft; missile target and reconnaissance systems; complete missile systems; electronic guidance systems; programs pertaining to liquid hydrogen propellants and cryogenic tankage systems; environmental testing of missile systems and components; and GSE.

May we help you? Write, wire, or phone Contract Administrator, Beech Aircraft Corp., Wichita 1, Kansas—or nearest Area Office.



The mix for peace:

ready today... building for tomorrow

TODAY the Strategic Air Command has the Atlas ICBM and the B-52 bomber. Tomorrow, in the day of the second generation ICBMs, we will need an even more advanced airplane with global striking power. The multi-purpose B-70 Valkyrie is being developed to meet this need ... to provide America with a true balance of manned and unmanned weapons. This 2000 mph manned bomber, with its advanced equipment and multiplicity of weapons, could take off from U.S. bases and strike almost any trouble spot in the world within three hours.

In this thermonuclear age, our mixed retaliatory power must be more resourceful, more versatile than ever before.

It must be capable of striking back with a retaliation so devastating that no potential enemy would dare aggression. In short, we must have the power of *total retaliation*—plus the swift, all-round capability to meet any threat to world peace, anywhere, anytime.

To maintain this effective force for peace, we must have *in being* a careful balance of weapon systems. Missiles alone cannot provide for the full spectrum of military action to meet any situation. Some victories are achieved only by the unique abilities of man. Man alone has the ability to reason, think, exercise judgment, observe, make spot decisions. Only a man can investigate, report, and return. And most significantly, only a manned weapon system can be put into instant action yet still be recalled before the final commitment to strike.

This is why the Mach 3 B-70 is being developed—to assure America of a secure retaliatory force in the future. And with this force rests our hope for a durable peace. For this is the only way the Free World can truly win: not by waging a third world war—but by preventing it.

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* Communications Contractor for the Air Force's Atlas Missile

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THE MAGAZINE OF AEROSPACE POWER

Volume 43, Number 7 • July 1960

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"We are dealing with a revolutionary and highly successful enemy. We must be at least as realistic as the Russians have shown themselves to be," declares this eloquent and persuasive plea for a . . .

RETURN TO REALITY

David E. Lilienthal

Three recent events have reawakened America to "the harsh realities of life as it is" after "two years of wishful thinking and fantasy about the approach of an era of peaceful coexistence and nuclear disarmament," writes Mr. Lilienthal. It is now time for this nation to act once again "with firmness and readiness to face up to facts."
—THE EDITORS

MAY 1960 may be remembered as the month when we Americans returned to the harsh reality of the world as it is. Once again our feet are on the rough and long and painful road to survival. Two years of wishful thinking and fantasy about the approach of an era of peaceful coexistence and nuclear disarmament are about to come to a close.

Three events can be thanked for this awakening:

- First, the demonstration of how little substance there is—in terms of survival—to all the fanfare over summit meetings outside the United Nations, and the essential hollowness of ceremonial visits of heads of state and lesser lights.
- Second, the collapse of the technical, and therefore the political, basis for an agreed ban on the testing of nuclear weapons.
- Third, the furor over an American reconnaissance flight into Russia.

The barrenness of trying to slow up or halt the nuclear arms race by an "inspection" agreement on an issue so collateral and essentially remote from disarmament as a "ban" on the testing of nuclear weapons, and the [succeeding] debacle of the summit conference, are events which the free world may view as a turning point of historic proportions. Something graphic was needed to awaken the people of America and Britain to the facts of life.

The major significance of the crackup of one of our reconnaissance planes within Russia, it seems to me, is that this episode dramatizes for the average citizen what has, quite unwisely I think, been hidden from him by the words of many of the world's political and intellectual leaders, West and East—namely: that the not-so-cold war has not and cannot, in fact, be abated by wishful thinking or a verbal escape from the evidence of the Soviet's determination to dominate the world, and the free world's equal resolution to remain free of such domination, come what may.

Once again we may begin to live in the world of reality, which is a world of constant danger. It may continue to be just that for a generation or more.

To face up, as now I believe even the most optimistic must, to the realities of how wide is the chasm between the Soviet world and our own is, I think, the only hope for the avoidance of war, and for building a solid foundation upon which two basically opposite concepts of life can manage to live side by side.

The sure road to war is to live in a fantasy, in a world that does not exist. Neville Chamberlain at Munich demonstrated how tragic this kind of escape from reality can be. World War II was a direct product of that kind of wishful thinking. The French confidence that the impregnable Maginot Line made an attack by Germany impossible is the older equivalent of the current doctrine that nuclear weapons possessed by both antagonists have produced a stalemate that frees the entire world from the danger of a nuclear war.

It is through such a dream world that the West has been passing. During this incredible period, however, the hard-bitten, realistic, and aggressive Com-

(Continued on page 9)

what is your *BORESIGHT* accuracy?

TEST RADOMES TO MIL-R-7705A (ASG)

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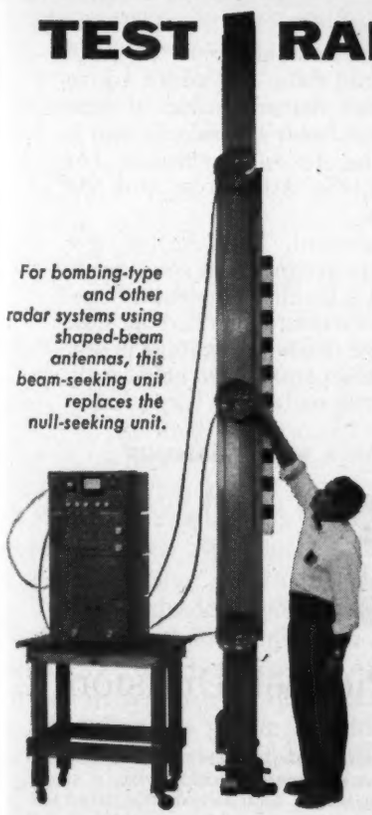
The effectiveness of the best airborne radar tracking system can be completely destroyed by deflection of the radar beam as it passes through the plastic radome. Now, for the first time, radome manufacturers and aircraft firms installing radomes can be completely assured of radome quality. CTI Automatic Radome Boresight-Error Measuring System replaces tedious spot checking with a continuous recording of beam shift across radome.

In the system shown above, as the motor-driven holding fixture rotates the radome under test, the servo-controlled null-seeking antenna on the boom traces the position of the deflected radar beam. At the control console, which provides single-point control of the entire system, three recorders plot the total magnitude and horizontal and vertical components of the beam deflection angle directly in milliradians. Rate of change of beam deflection, essential to missile applications, is readily obtainable from the recordings.

Additional features include automatic plotting of antenna patterns with or without the radome and radome transmission efficiency measurements. The system is available in frequencies from S through K_a bands and infrared.



For bombing-type and other radar systems using shaped-beam antennas, this beam-seeking unit replaces the null-seeking unit.

Engineers: Career opportunities are currently available at CTI

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Much that was new and informative was discussed and demonstrated at Eclipse-Pioneer's recent cost conference held with representatives of the Air Force, Republic Aviation, and over 50 of E-P's subcontractors and suppliers.

Bendix cost conference reports

IMPORTANT PASS-ALONG SAVINGS

on F-105D Air Data and Instrumentation Systems

Spelled out to E-P vendors were advanced techniques that shaved significant dollars from the manufacturing costs of Air Data Computer Systems and Vertical-Scale Instruments for the USAF's Republic-built F-105D Thunderchief.

Objective was to stimulate E-P's vendor organization into similar types of cost reduction effort.

One successful E-P cost-saving technique presented was the use of "electronic instructors" on the assembly floor. These novel audio-visual aids—individually controlled by each assembly worker to his own learning rate—reduced lead man requirements by 80%, cut learning time in half. Another technique discussed was the replacement of point-to-point wiring with prefabricated harnesses to improve quality, reduce assembly time.

Other savings noted came from the use of close-range slow-motion pictures to seek out "lost motion" in assembly operations, from the use of tool standardization and material handling innovations, and from the use of standardized data. All added up to an effective demonstration of how E-P KNOWMANSHIP has saved—and is continuing to save—money for Republic, the Air Force, and the taxpayers.

This practical, hard-boiled E-P approach to getting more equipment-per-dollar is another important benefit of KNOWMANSHIP. To find out how it can work to *your* advantage in any of the product areas listed below, call, wire or write us today.

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munists were softening up our American resolution—their prime target.

They flooded us with horror stories of mutual suicide by atomic warfare, and alluring but empty offers of peaceful coexistence, total disarmament, and an end to nuclear weapons.

They realized that if by threats and promises our will to resist was eroded, freedom might perish without a single shot being fired. I think we must admit that their campaign was partly successful.

Now we are ready, I hope, to put aside the superficial hopes engendered by the "spirit of Camp David," or the notion that visits of Russians to this country, and Americans to Russia, highly desirable and beneficial as they are, in themselves have any basic relation-to survival. We are now ready, I hope, to recognize that these are only sideshows that to many have obscured the real and basic obstacles to getting along with the Soviet system.

We are, I hope, ready to put aside, too, the wishful thought that the Russian political leadership desperately wants disarmament because they must keep their people happy with consumer goods, and cannot do so unless their huge costs of armament are diminished.

Perhaps now we can come to grips with the central problem. That is to return to our efforts, exhausting but essential, to learn, step by cautious step, case by case, the process of negotiation with political leaders whose concept of life is almost as far from ours as if they were beings on another planet.

It is in the American temperament to be sanguine, to believe the best of others. It is also in the American temperament to face up to whatever must be faced, but only when some dramatic fact forces us to. The story of Pearl Harbor is a classic in this category.

There is a wealth of impressive evidence that the American people can face hard, cruel, and disappointing facts, and can act with vigor, toughness, tenacity, and firmness. Here I think is the hopeful side, and the saving grace of the rather sudden disillusionment of the past weeks.

It was American firmness and readiness to face up to facts that helped get the Red Army out of Iran, that rebuilt our armed forces and thereby kept the Chinese out of South Korea, that saved Greece and Turkey, that helped produce a peace treaty of Austria, that saved Berlin by the amazing airlift. On almost any of these acts of resolution, the Soviets might have gone to war. They didn't.

We are dealing with a revolutionary and highly successful enemy. We must be at least as realistic as the Russians have shown themselves to be. We do not want to compete with them by imitating their closed society, their lying to their own citizens. We need above all to be ourselves, Americans at our best. And at our best we do not flinch from facts, we do not insist that our public servants feed us only good and pleasant words, but that they tell us the truth, however distasteful.

Let us hope that the debacle of the summit and the maneuvers of the nuclear test ban negotiations will mark the beginning of a period of realism in our dealing with the Soviet.

A peace that is no peace, a "thaw" that is not warming up except in the most superficial ceremonial sense, a consequent lulling and deterioration of American resolve and will to stand firm for what we believe—this is not the road to peace. On the contrary, it is the road to disaster.

A stockpile of atomic and other weapons are inert machines. They have no deterrent value whatever, unless there abides the will to use those weapons rather than surrender freedom.

There is as yet no evidence that facing up to reality in dealings with the Soviet adds to the risks that already exist. My own opinion is that the greatest risk of all would be to continue to nurse the illusion that international tension is relaxed because we ourselves have been relaxing.—END

Mr. Lilienthal, born in Illinois sixty-one years ago this month, headed the Tennessee Valley Authority from 1941 to 1946, then served as first chairman of the Atomic Energy Commission from 1946 to 1950. Now a private citizen, he is chairman of the board and chief executive officer of the Development and Resources Corporation of New York, which has administered major resource development projects in the Middle East, South America, Italy, and Puerto Rico. Mr. Lilienthal, during his service with the AEC, also acted as chairman of a State Department board concerned with international control of nuclear energy. This article first appeared in the Washington Star *of May 15 and was inserted in the* Congressional Record *the following day. It is reprinted here with permission from the author and the* Star.

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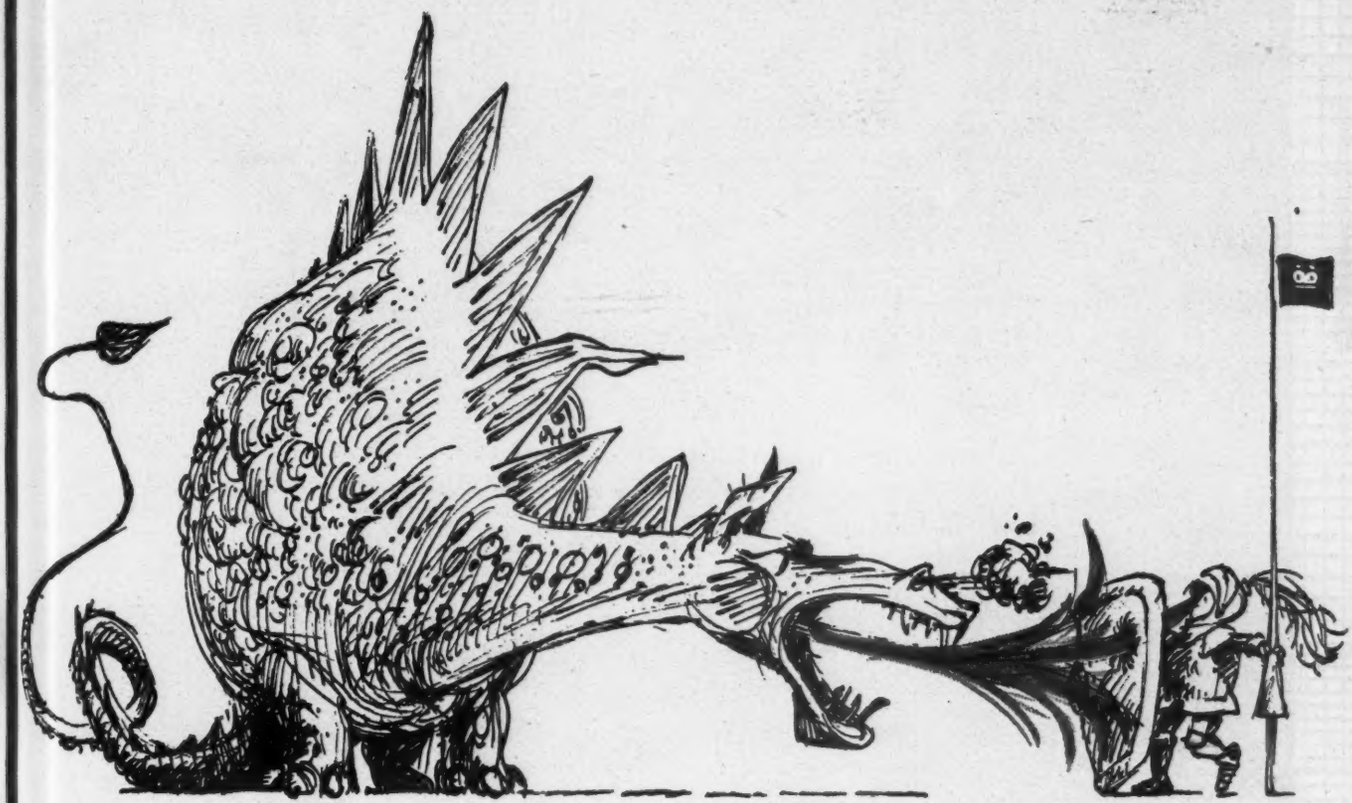
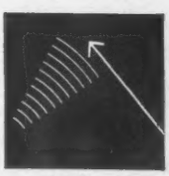
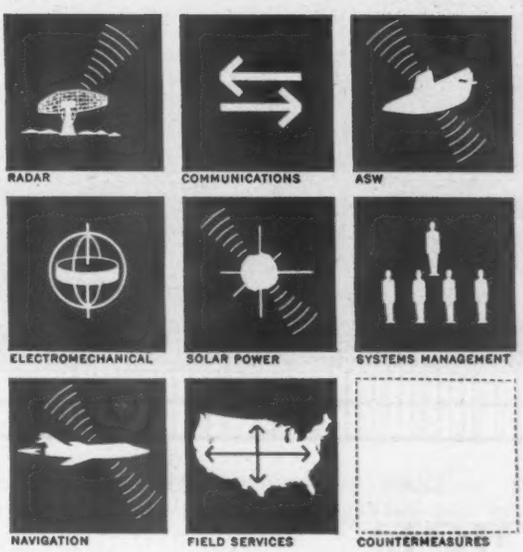


countermeasures problems?



Electronic Countermeasures provide the "invisible shield" in our nation's defense against potential aggressors. And, like a shield, they must be reliable to insure complete protection. Hoffman has been in the forefront in this field for many years, adding its engineering know-how to accomplish new advancements in countermeasures techniques. The Tall Tom electronic reconnaissance system, ULR-5 shipboard system, and PLR-5 man-pack receiver are examples of Hoffman's capability in advanced countermeasures systems—capability which can help to solve your most critical electronic countermeasures problems.



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Military Products Division

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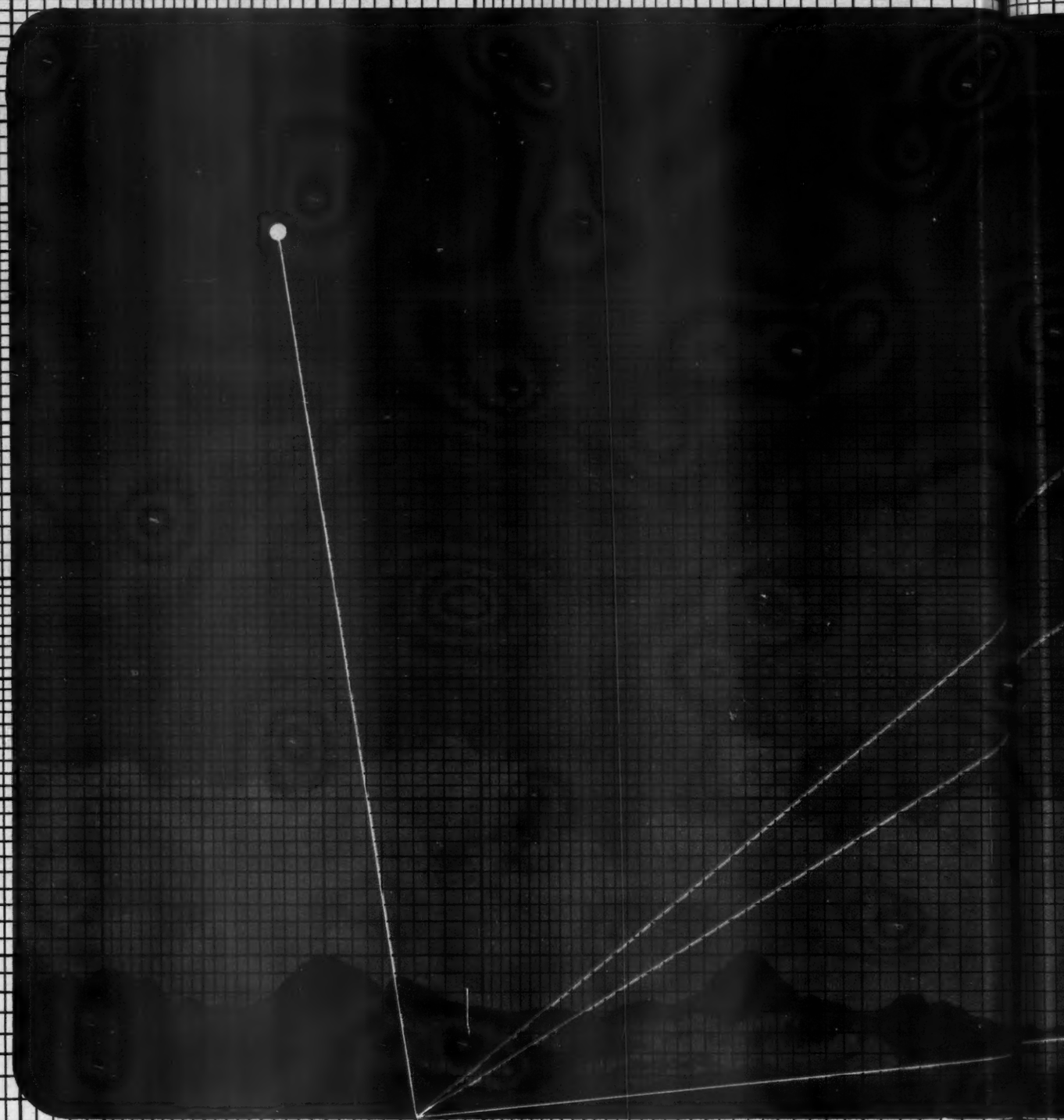
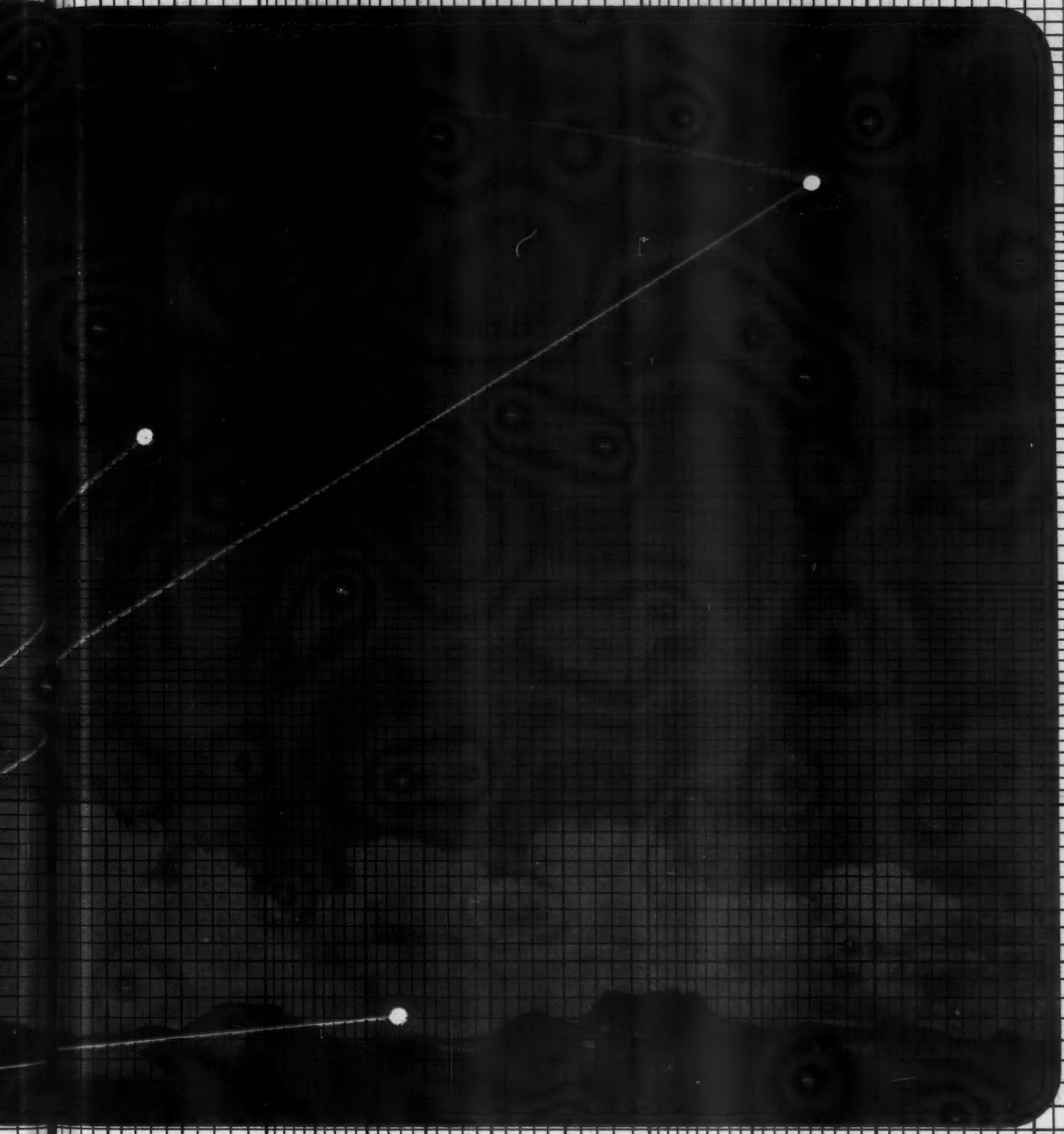


PRECISE MEASUREMENT IN SPACE... with New Westinghouse Radar Technique



An entirely new Westinghouse radar technique now under development at the Electronics Division will sharply increase the accuracy of radar detection, identification and tracking of objects in space.

Utilizing a single radar, the Westinghouse technique opens the door to many important new applications. Among them are accurate measurement of objects in space, satellite reconnaissance, air-to-ground surveillance and mapping and ground-to-air tracking and identification.

We would be pleased to discuss these new developments with qualified persons on a classified, need-to-know basis. Contact: Marketing Manager, Electronics Division, Westinghouse Electric Corporation, Baltimore, Maryland.

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Reawakening Necessary

Gentlemen: Permit me to compliment you for having published "Decadence or Dedication?" It is forcible, to the point, and timely.

Every man, woman, and child should be apprised of this tragic state of affairs. The rebirth of our great nation appears to be necessary, now, at the eve of moral, political, and economic disaster.

You have placed the handwriting on the wall for all to read. What are we going to do about it?

Let us stick out our necks and act!

Albert Jason
Oakland, Calif.

Gentlemen: Re your May issue, "Decadence or Dedication?"—Horrah!

I'm senior research engineer for Avien and president and development engineer for another company, work sixty to eighty hours a week, don't drink, smoke, or philander. Have been serving the Air Force, in one way or another, for nearly twenty years as an engineer, and am America's most happily married man. There are many like me.

Keep faith! The Giant is *now* awakening.

Albert L. deGraffenried
Woodside, L.I., N.Y.

Policing Impossibility

Gentlemen: Mr. Voss's article, "Can We Live With a Nuclear Test Ban?", struck me as a masterful piece of issue-dodging.

Nowhere did I see even the slightest reference to the critical issue at stake. Judging from the article, the question of whether or not to join in a nuclear test ban should be decided purely on the basis of the efficiency of detection methods.

With no other information than that presented in the article, the reader is left wondering why anybody wants to ban the tests in the first place. Just to refresh Mr. Voss's memory, here are a couple of "certainties" he neglected to mention: 1. If nuclear explosion tests are continued uncontrolled, by a steadily increasing number of countries, sooner or later the earth's atmosphere is going to become polluted with radioactive debris, beyond human tolerance. 2. These tests consume significant quantities of irreplaceable fissionable material, which is almost inevitably going to be our basic energy source. . . .

The first of my certainties is beyond question. The only doubtful factor is the time involved. . . .

My second certainty may not sound very urgent right now, since we still have plenty of petroleum and gas, and there is a surplus of uranium. The calamity-howlers have been predicting the exhaustion of petroleum ever since I can remember, and people have relegated them to the status of the boy who cried wolf. Here is a statistic that may bring them back to reality: If the whole sphere of the earth were one big oil tank, and if petroleum consumption continued on its present trend, we would run out of oil in about 2360. As it is, it appears wildly optimistic to expect our petroleum to last more than another century, and I would not be surprised to see the end of the usage of petroleum fuels within thirty or forty years. After that, the only portable energy source now foreseeable is the nuclear reactor. . . . Every pound of U-238 or plutonium that we burn up in tests is just that much closer to the day when our civilization runs out of gas.

My point, as you may have deduced, is that I consider a test ban desirable, even though some immediate technical advantage may be sacrificed. What we need is better rockets, not better bombs.

Maj. David H. Rust, AFRes.
Lake Charles, La.

● *The point of Mr. Voss's article is that it is impossible to police underground testing in light of present technology. Hence, any ban could be violated through underground testing. Does anyone feel that we would violate a ban—and that the Soviets would not? That is the key and crux of the argument.*—The Editors

Office Consolidation

Gentlemen: . . . The item in the "Aerospace World" department (May '60) concerning the establishment of the office of the Deputy Inspector General for Safety is appreciated. We in the safety business feel that consolidation of safety functions in one office will result in a more efficient and effective operation.

Air Force/Space Digest is to be complimented on the consistently high quality of its general content. Since inception it has served as a source of authoritative information in matters pertaining to flight.

Maj. Gen. Joseph D. Caldara
Deputy Inspector General for Safety
The Inspector General
Washington, D.C.

Wrong State!

Gentlemen: I would like to call your attention to an error in the May issue. On page 70 under the title "Space Capsules," the SETP is listed as being in Lancaster, Pa. It's in California.

Thank you for the mention—we would be very happy to furnish your readers with a copy of our *Quarterly Review*.

M. L. Kurtzman
The Society of Experimental Test Pilots
Lancaster, Calif.

No Ulcers Here

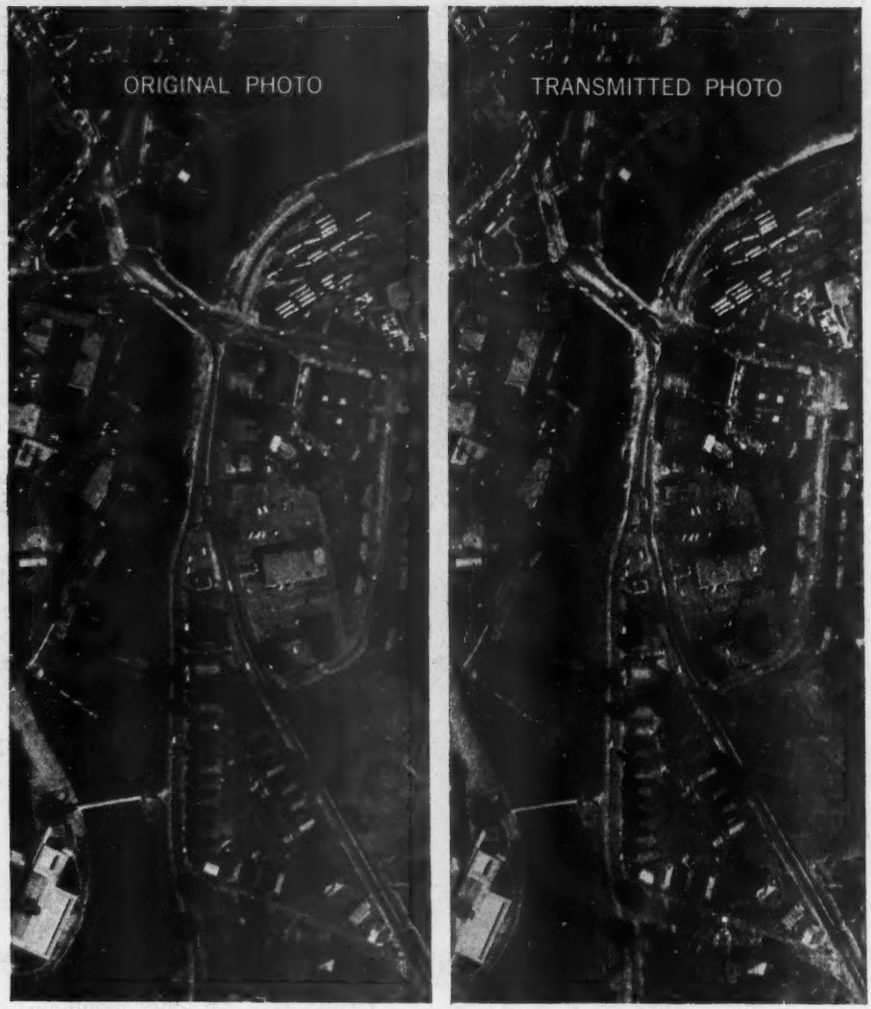
Gentlemen: . . . The article in your May issue on the 1365th Photographic Group entitled "Hollywood Without the Ulcers" was well received locally. At the request of Headquarters USAF I had been of some slight editorial assistance in bringing the article up to date. It seems ironical that we are so busy depicting the activities of the rest of the Air Force that we are unable to broadcast our own accomplishments. The Air Force's method of utilizing the services of our contemporaries in the motion picture industry is a relationship hitherto not well understood by many.

I personally find the entire magazine very interesting. . . .

Lt. Col. James P. Warndorf
DCS/Photography
Orlando AFB, Fla.

Gentlemen: Lt. Col. Carroll V. Glines's "Hollywood Without the Ulcers"

(Continued on following page)



CBS LABORATORIES PHOTOSCAN SYSTEM

PHOTOSCAN, a radical advance in aerial reconnaissance technique, makes it possible to transmit visual information from manned or unmanned aircraft to ground receivers in seconds, without loss of detail.

The high performance of CBS LABORATORIES PHOTOSCAN is illustrated above. On the left is an enlarged portion of the original aerial photo which covered an area of sixty-four square miles. On the right is a portion of the reconstituted picture after transmission through the PHOTOSCAN System.

Challenging career opportunities are available at CBS LABORATORIES on long-range systems development programs such as PHOTOSCAN. Positions for physicists and electrical engineers are now open in the following department: Military and Industrial Systems; Acoustics and Magnetics; Solid State Physics; and Vacuum Tube Physics.

Please forward resumes in complete confidence, or obtain additional information by contacting CBS LABORATORIES.

CBS LABORATORIES

HIGH RIDGE RD. STAMFORD, CONN. • A DIVISION OF COLUMBIA BROADCASTING SYSTEM, INC.

You are invited to visit CBS LABORATORIES Booth No. 2523 at WESCON Show, Aug. 23-26, Los Angeles

(May '60) was fine reporting but had nary a mention of the magnificent job being performed by Air Force's Lookout Mountain Laboratory in Hollywood, officially known as the 1352d Motion Picture Squadron. This resourceful group, under the Orlando Headquarters, is self-sufficient, operating its own field units, sound stages, and laboratories in the hills of Hollywood.

Moreover, they have the prime support responsibility of documenting the ICBM program at Vandenberg.

Let's give the California contingent —as well as Florida—credit for a job well done.

Alan Gordon
North Hollywood, Calif.

SAC WAFs Also Helped

Gentlemen: The article by Richard M. Skinner in the June issue of AIR FORCE/SPACE DIGEST concerning the stained-glass windows in the Base Chapel at SAC was most timely.

But why did he not devote at least *one* sentence to the women in the Air Force who also serve SAC?

For his information and yours, the WAF Pi Chi Sigma (Protestant Society) and the WAF Lisieux Society (Catholic) each contributed generously, and each has a beautiful stained glass window in the Chapel.

Capt. AnnaBelle Peshek
Lincoln AFB, Neb.

Put the Heat On

Gentlemen: Would it not be well for the editors of AIR FORCE/SPACE DIGEST to have a person with proper qualifications prepare an article on the problems to be forced on the Soviet economy by our development of the B-70?

Captain Konigsberg's letter in the May issue may reflect the general misunderstanding in the minds of many readers concerning the Russian economy. All is not well with Messieurs K and Company under their own vine and fig tree.

A simple analysis of Khrushchev's scuttling of the summit meeting provides patent evidence of the dire need to take the minds of the home folks off their own discontent. It is an old subterfuge of the Bolsheviks. Remember the story of the lad who shouted, "Wolf, wolf," when there wasn't any wolf. One of these days the "Crook in the Kremlin" will try it once too often. Let us do all we can to hasten that day.

People cannot live on promises alone. The conversion of the kopeck

(Continued on page 19)

Honeycomb fins for the Convair 880. The sleek new 880 has many important components produced by Avco, and employing its Avcomb structural materials. Contributions include the incredibly strong vertical and horizontal stabilizers, rudder, elevators, wing tips and wing leading and trailing edges. These lightweight components are only the latest examples of Avco/Nashville's vast reservoir of experience and production capability in advanced aircraft structures. Avco's Nashville Division will also produce important structures for the newer Convair 600.

Avco

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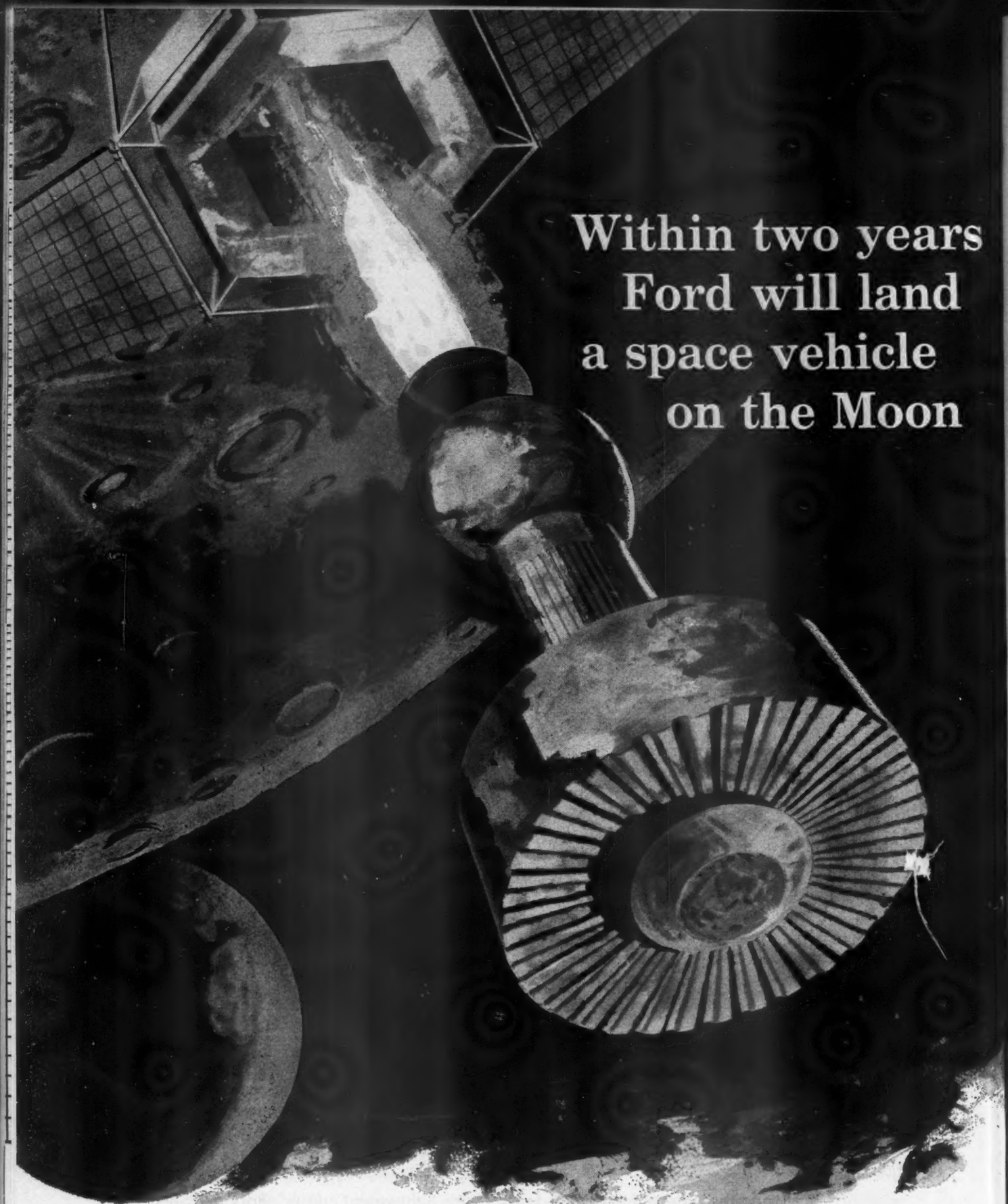

Within two years Ford will land a space vehicle on the Moon

A 300-pound Lunar Capsule containing scientific instruments will soon make a "rough" landing on the Moon. It will be carried by a larger spacecraft to a location about 25 miles from the Moon's surface, then released. A retro-rocket will cushion its impact. The Lunar Capsule will transmit vital scientific data back to Earth for a month or more. This unique space vehicle will be the product of Ford Motor Company's Aeronutronic Division.

THIS LUNAR CAPSULE, now under development for NASA's Jet Propulsion Laboratory, is one of many space-oriented programs now under way at Aeronutronic Division of Ford Motor Company.

These programs—and many others related to advanced weapon systems and computer systems—are being carried out at Aeronutronic's multi-million dollar Engineering and Research Center, in Newport Beach, California. They emphasize Ford's rapidly growing role in meeting the needs of science and defense in the Space Age.

A booklet describing Aeronutronic's accomplishments and capabilities is available to you on request.

AERONUTRONIC

AERONUTRONIC DIVISION *Ford Motor Company*, DEFENSE PRODUCTS GROUP

Ford Road, Newport Beach, California

WEAPON AND SPACE SYSTEMS • COMPUTERS AND DATA PROCESSING SYSTEMS
MISSILE RANGE SYSTEMS AND INSTRUMENTATION • ADVANCED ELECTRONICS
Career opportunities are open for engineers and scientists

enhanced the stature of the ruble in world commerce but didn't lower the prices of essential commodities for the proletarian consumers. I have no objection to the Russian people enjoying a higher standard of living per se. But I do oppose it, if by so doing the days of the cold war can be shortened. Then the living standards of all peoples can be raised, and the world's population have an opportunity to live in some greater degree of security.

Lt. Col. Franklin D. Morrison
Cleveland, Ohio

● *We agree with Colonel Morrison. The Soviet economy can't stand having much more taken out of it for military expenditures. Ours can. It makes sense to us to turn up the heat rather than leaving the burner on "simmer."*—THE EDITORS

First Issue of New Magazine

Gentlemen: I take this opportunity of writing to you in respect to an Indian magazine, *Home Defence,* which is the official magazine of the Home Guards, the Indian Institute of Home Defence and the Institution of Fire Protection Engineers.

Organizations such as the Home Guards, the Police, the Fire Services, etc., have played a notable part in the maintenance of law and order, in the preservation of private and public property, and it is but natural that the exemplary services performed by such organizations should receive greater recognition than has been given them hitherto. It is for this purpose we have started a new magazine called *Home Defence.* . . .

The endeavor that we have taken we feel is modest. In its development and establishment as an entity, we must have support from your side—by allowing us to reprint the articles either in part or full from time to time from your publication.

For our first issue, which will be out very shortly, we would like to publish the following articles: "Survival in the Nuclear Age," by Eugene M. Emme and "Space Realism," by Lt. Gen. Bernard A. Schriever, both from the January 1960 issue; and "Your Backyard Is the Battleground," by Leo A. Hoegh, from the November issue.

Miss R. D. R. Doodhmal
Home Defence
Bombay, India

● *Herewith our permission to reprint the articles—and our best wishes for the success of your new enterprise.* —THE EDITORS

TOP SPEAKERS

Honorable Dudley C. Sharp
Secretary of the Air Force
Speaker
Awards Banquet
Friday, Sept. 23

General Thomas D. White
Chief of Staff
U. S. Air Force
Speaker
Aerospace Luncheon
Thursday, Sept. 22

PARTICIPANTS

- *Major Air Commanders*
- *AFA Leaders*
- *Leading Educators*
- *National News Media Representatives*
- *Air Force Staff Officers and Unit Commanders*
- *Air Reservists*
- *Air National Guardsmen*
- *Outstanding Airmen*
- *Industry Executives*
- *Aerospace Exhibitors*
- *Reunion Groups*

AEROSPACE PANORAMA?

San Francisco • September 21-22-23-24-25

THE PROGRAM

• WEDNESDAY, SEPTEMBER 21:

2:00 PM AFA Directors' Meeting
7:30 PM AFA Leaders' Meeting

• THURSDAY, SEPTEMBER 22:

9:00 AM Hq. USAF Briefing
9:00 AM Reserve Forces Seminar
11:00 AM SAC Briefing
12:30 PM Aerospace Luncheon
3:00 PM MATS Briefing
3:00 PM 1st AFA Business Session
5:00 PM NORAD Briefing
7:00 PM Panorama Preview Reception

• FRIDAY, SEPTEMBER 23:

9:00 AM 2d AFA Business Session
9:00 AM Industry Seminar
12:00 N Industry Buffet Luncheon
12:00 N Panorama Open
2:00 PM ARDC Briefing
3:00 PM 3d AFA Business Session
4:00 PM TAC Briefing
7:45 PM Awards Banquet

• SATURDAY, SEPTEMBER 24:

9:00 AM Annual Symposium
12:00 N Panorama Open
9:30 PM Air Force Reunion Party and Ball

• SUNDAY, SEPTEMBER 25:

12:00 N Panorama Open to Public

IF YOU have not already registered in advance for AFA's 1960 Convention in San Francisco, you can use the convenient Advance Registration tear-out form below.

Program highlights will include a briefing by top representatives from Headquarters USAF, and additional Command briefings by Strategic Air Command, Military Air Transport Service, North American Air Defense Command, Air Research and Development Command, and Tactical Air Command. Generals Power, Kelly, Kuter, Schriever, and Everest will conduct briefings for their respective Commands. Generals Hall, Atkinson, Kelly, and Everest will be featured at the Reserve Forces Seminar.

The full schedules of past AFA Conventions have not always offered enough free time for delegates to see all sights of the city in which the Convention was being held. The 1960 Convention will give everyone a chance to attend all of the Convention events, the Panorama displays, and see all of the beautiful sights.

Everyone is requested to register IN ADVANCE. Credentials will be required to attend meetings and the Panorama during "closed" periods. Due to the heavy registration expected for AFA's 1960 Convention and Panorama, separate tickets may not be available to the BASIC REGISTRANTS.

Complete, Attach Payment, and Mail to AFA, Mills Bldg., Washington 6, D. C.

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☐ INDUSTRY REGISTRATION $30.00
(Includes tickets and credentials to all Convention events)

☐ REGULAR REGISTRATION $25.00
(Includes tickets and credentials to all Convention events except Buffet Luncheon)

☐ BASIC REGISTRATION ..... $ 7.00
(Includes credentials, meetings, Panorama Reception, but not tickets to any of the other Convention events)

7-60

SEE PAGE 133 FOR HOTEL INFORMATION

America's biggest, most versatile satellites

What's New With ★ RED AIRPOWER

Here's a summary of the latest available information on Soviet air intelligence. Because of the nature of this material, we are not able to disclose our sources, nor document the information beyond assurance that the sources are trustworthy.

Do the Russians possess a surface-to-air missile that could have hit our U-2 photo plane at 60,000 feet or higher? Sources abroad long have maintained that they do have such a missile.

One of the key men in the USSR's antiaircraft missile program is Semyon Lavochkin, one-time aircraft designer who has turned out no new aircraft in several years, but who occasionally wins Stalin or Lenin prizes. Lavochkin has reportedly contributed greatly to the aerodynamics of Soviet antiaircraft missiles, and perhaps also to their air-launched cruise missiles.

• • •

The U-2 incident brought forth numerous reports of Soviet flights over Alaska and other parts of the western hemisphere including Greenland. Recently, the Soviets have taken to flying over Japan on a regular basis, using high-altitude, multiengined jets.

So far as is known, the Russians have not designed any special reconnaissance aircraft in recent years, though they have had such aircraft in the Red Air Force in the past. A turboprop version of the TU-4 was adapted for long-range reconnaissance in the days following World War II. They worked on a diesel-engine aircraft at one time with the apparent aim of using it for long-range spying. But nothing appeared to have come from this project.

Currently, Russia uses jet bombers for such purposes.

• • •

Changing Russian attitudes on sovereignty in outer space provide an interesting footnote to the U-2 case. Like other nations, the Russians in the past said all space above their territory was under their jurisdiction and they had sovereignty over it. However, they began to shift on this at about the time they launched their first space satellite. Then they said a nation should exercise sovereignty over atmospheric space, but outer space should not be governed by national sovereignty.

Now the Russians are changing their tune again. In the last year, they have taken the position that, so long as outer space was used for research purposes, there should be no question of sovereignty involved, but that the laws of sovereignty should apply to space vehicles used for "spying" or political or military purposes. The first Air

Force Midas spy-in-the-sky satellite the US launches in a polar orbit therefore could bring a Soviet complaint. The Midas launched May 24 was placed in a nonpolar orbit. This orbit did not at any point take this test Midas shot over the USSR.

• • •

The "unmanned space capsule" Russia placed in orbit on May 15 was a partial failure.

Final separation of booster and space capsule was not achieved. It would have sent the latter toward the earth and a safe recovery. When the Reds triggered the separation, both the booster and the capsule went into orbit. So the hoped-for recovery did not materialize, any more than in the case of USAF's own Discoverer capsule recovery attempts.

The shot nevertheless was impressive. Placing four and a half tons in orbit is no mean feat. It once more showed Russia's advanced thrust capabilities, judged by some to be enough to launch a better-than-rudimentary, man-carrying spaceship.

Among other specifics Russian scientists worked on with the May 15 shot were these:

- Acceleration control during launching so that it is neither too fast nor too slow. If too fast, a man inside a space capsule might be injured. If too slow, too much fuel would be consumed and the space capsule would not achieve a proper orbit. The Russians hope to send a space traveler on his way without increasing the G forces on him more than sixfold during launch.
- New fuels. The Reds say a satisfactory compromise between man and rocket calls for a ten-minute launch period during which power is applied. This is quite long, but the Russians claim they will do it with new fuels such as those tested on May 15.

Professor S. N. Vernov, mentioned in this column last month for his work on radiation belts around the earth, has won a Lenin Peace Prize for his efforts. He shared the prize, something more than 50,000 tax-free rubles (officially $12,500), with several colleagues.

Another Lenin Prize winner was aircraft designer Sergei V. Ilyushin, who was cited for his work on the IL-18 Moscow turboprop transport. Sharing honors on the IL-18 was Alexander G. Ivchenko, who developed the turboprop engine used on the Moscow as well as on the AN-10A transport.

• • •

Russia continues its valiant efforts to sell its transports and helicopters in foreign countries. A few IL-18s and TU-104s have been sold for civil use. Helicopter sales have been practically nil. The fact that the Reds have purchased American helicopters has dampened foreign sales of their own MI-4, and may have a bad effect on their campaign to sell transport aircraft as well. Soviet purchase of US helicopters is taken as an indication abroad that even the Russians feel they have something to learn from the US in this regard.

The Russians have their TU-124 jet transport flying on test at Ramenskoye, not far from Moscow. It is possible the airplane will be shown publicly in the near future. This latest Tupolev design is thought to be a flying test bed for features that will be used later on a supersonic transport.

• • •

Talks between the US and USSR on direct air service between New York and Moscow were scheduled to get under way by the time this appeared. However, it was extremely doubtful much can be accomplished until the international picture brightens.—END

are being built at Satellite Center, U.S.A.

Satellite Center, U. S. A., is located in the San Francisco Bay area at Sunnyvale, California. From Lockheed's vast new Satellite Systems Building come the Agena satellite of the Air Force Discoverer program; the Agena B planned for lunar and deep-space probes; and the satellites for the Air Force's Midas (missile defense alarm system) and Samos (strategic surveillance system).

LOCKHEED MISSILES & SPACE DIVISION SUNNYVALE CALIFORNIA

Electronics: key to the

secret sea

The problems posed in developing an effective Anti-Submarine Warfare System require the development of entirely new concepts in the broad field of electronics.

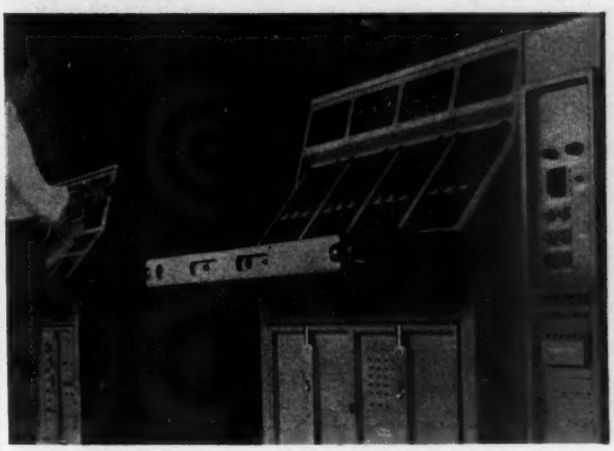
Applying electronics skills toward each of the many elements of the problem is only part of the job. The real key is in the integration of these elements into total systems that effectively solve the problems of ASW.

Working with the Navy, Hughes has instituted a complete systems analysis or "information environment" approach. This Hughes "systems orientation" draws upon unique abilities acquired in the development of such Hughes systems as: airborne electronics armament systems, which can control an entire mission; 3-dimensional radar systems, which constitute the most important advance in the state of the art since radar itself was invented; Falcon guided missiles, which are the most advanced weapons of their type—just to name a few.

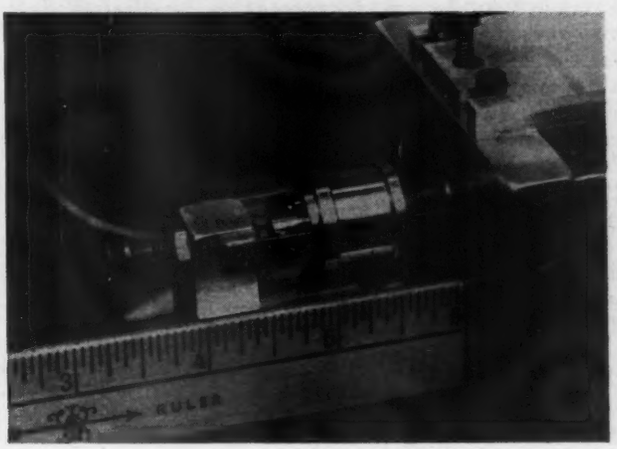
Rather than taking standard approaches to the ASW problem, Hughes engineers are using a wide variety of electronic disciplines. Studies presently underway include: research in acoustic array systems (both fixed and mobile); radar and IR detection systems; magnetic anomaly detection systems; information, command and controls systems for strategic decision-making and for tactical operations; communications systems; signal recovery techniques; human factors studies.

Foresight, imagination, tested and proven management capability—these are the factors which insure successful Hughes systems implementation. For further information concerning the Hughes "information-environment" approach, please contact: Mr. D. R. Heebner, Underseas Warfare Mission Coordinator, Hughes Aircraft Co., Fullerton, California.

This simulated Navy Combat Information Center uses Hughes advanced information and display systems to unite hundreds of pieces of surveillance data into a meaningful total.



To study ultrasensitive infrared systems for ASW, Hughes engineers have developed this prototype miniature super refrigerator which cools sensitive elements to temperatures as low as −260° C.



Creating a new world with ELECTRONICS

HUGHES

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AIRPOWER in the news

Claude Witze
SENIOR EDITOR

A Change in Atmosphere

WASHINGTON, D. C.

Although his testimony does not appear in the newly published transcript, there are rumors in the Pentagon that N. Khrushchev was a witness at some closed sessions of the Senate Subcommittee on Defense Appropriations. The rumor, of course, is incorrect.

It is a fact, however, that the belligerent Russian's form cast its shadow across the hearings, particularly during late May, after the collapse of the summit. This does not mean that the Soviet threat monopolized the sessions. When Army Secretary Wilber Brucker was on the stand, for example, the Bay State's Senator Leverett Saltonstall found time to put in the record that the American GI had cranberries on his menu twenty-eight times in 1959 and thirty-six times in 1960. Pressed by Mr. Saltonstall for more liberal servings, the Army Secretary indicated the outlook is pretty good. If for no other reason it could be because Michigan, as well as Massachusetts, markets a good many crates of cranberries. Mr. Brucker once was Governor of Michigan. Incidentally, he offered no comment when it was suggested that Senator Milton R. Young of North Dakota might put in a plug for pheasants, which are numerous in his state and practically ignored by GI menu-makers. Senators from chicken-producing states kept their peace.

In the midst of this trivia the committee, prodded by such realists as Senators Russell, Jackson, and Symington, looked with suspicion on the apparition from the Kremlin that was hanging over their proceedings. Mr. Russell delivered himself of the opinion that the United States may have deluded itself in the past two or three years with the idea that Mr. K. wanted to ease tensions. Even if that has been true, the Senator said, it is not true any longer, and "a man who is erratic enough to do what Khrushchev did in Paris is capable of doing almost anything. We have too much at stake here in this country to risk dealing with him from anything except a position of strength. I am afraid we do not have the strength at the present time. I am afraid we did not have it in Paris; that is the reason things turned out as they did."

Mr. Jackson, who is not a member of the panel but enjoys guest privileges, feels so strongly that he put himself on the stand as a witness. A sound defense structure, he pointed out, is something that is supposed to stand in fair weather and hurricanes. The need is with us, "whether Khrushchev smiles or frowns, is calm or hysterical, talks peace or war, is willing to talk to the President or not."

He asked: "How many Berlins, Hungarys, Sputniks, and U-2s must we have to convince us of the permanent need for an adequate defense?" From there he went on to plead for reconsideration of funds for specific weapons, ranging from Bomarc to the Navy's aircraft carrier. He argued for the reconnaissance satellite program, characterized as an opportunity for scientists to open a big hole in the Iron Curtain.

Senator Symington raised the issue of our air defense program, with particular reference to Alaskan-based interceptors. In effect, he accused USAF of neglect in the face of a Russian buildup across the straits in Siberia because it has dropped a plan to put more modern aircraft on bases in the new state. He managed to drive home the truth that it is a budget requirement, not a defense requirement, that the Air Force is meeting.

Earlier, the Democratic presidential aspirant forced into the record some of the reasons why the B-70 bomber, gutted by the Administration a few months ago, is considered essential to the Air Force. The Chief of Staff, Gen. Thomas D. White, was on the stand. He agreed, in effect, with a Symington statement that if we do not pursue the B-70 as a complete weapon system, we will let a major aeronautical advance go to the Reds by default. "In a cold war," said General White, "economically as well as militarily, it is something we cannot afford *not* to do."

Contrasted with the House Defense Appropriation hearings, which were carried out in an atmosphere soggy with the spirit of Camp David, the Senate sessions were refreshing. There were fewer approaches from the standpoint of what we can afford and more from the standpoint of what we need. There was generous talk, particularly after the news from Moscow and Paris had been absorbed, about where things like Bomarc, the B-70, and additional ICBM units would fit into the nation's posture as defender of the free world. What the Senate committee did was simple and direct: It added better than a billion dollars to what was approved in earlier action by the House. This resulted in a Senate version total of $40,384,897,000 for defense in fiscal 1961—up $1,049,897,000 over the Administration's estimate.

For USAF Operations and Maintenance, the committee recommended $4,240,732,000, up $68,328,000 from the figure suggested by the House but still down from the budget estimate by $41,268,000. It will provide for an Air Force of ninety-one combat wings. Here is the level of forces proposed for fiscal 1961:

Strategic wings	38
Air defense wings	20
Tactical wings	33
Tanker squadrons	66
Air transport squadrons	21
Other operational flying squadrons	27
SAGE centers	23
Radar ACW stations	187
DEW Line stations	67
Ballistic Missile Early Warning Site (BMEWS)	1

For aircraft procurement, the USAF won approval of $3,607,409,000 from the committee. This is intended to complete fourteen wings of B-52 jet bombers and continue the B-58 procurement to replace the older B-47. More

(Continued on page 29)

Raytheon's New Scan Conversion System Provides Memory, Brightness, Alpha-Numerics, Instant Erase

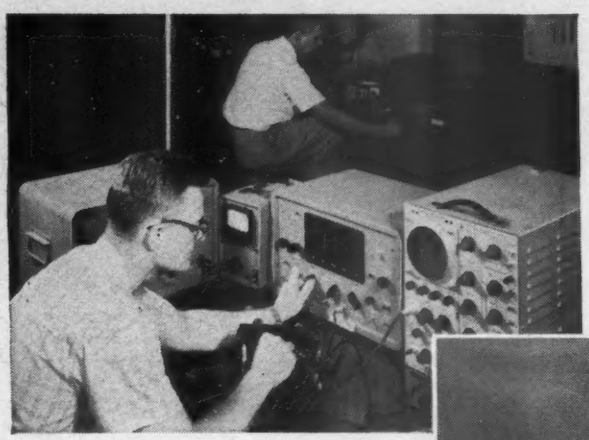
Raytheon's New Scan Conversion System achieves and improves air traffic control with: continuous . . . accurate . . . bright display of all target-in-area information. MEMRAD, the display's two-gun cathode ray tube, stores, converts, and projects radar data on any number of TV monitors. Image is 300 times brighter than conventional PPI. Targets show as continuous trails from which speed, position, direction may be read or transmitted electronically.

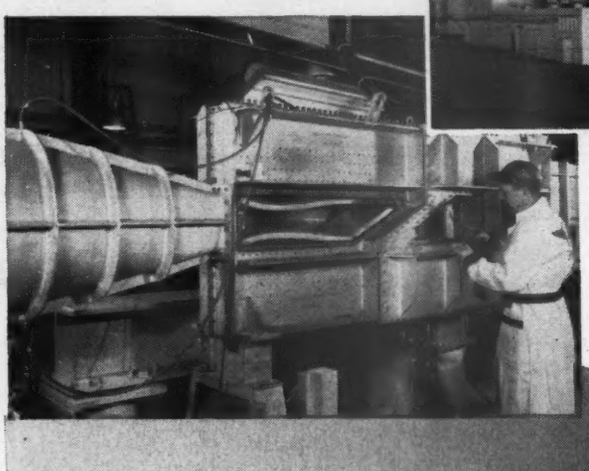
The display also provides instant image erase, and generation of alpha-numeric symbols that lock on and move with target automatically. Masks, subnormal room illumination, all human error related to oral-manual plotting are eliminated. Superimposition of maps, off-centering, large screen TV projection make Raytheon's SCS the vital element in more sophisticated systems.

RAYTHEON EQUIPMENT DIVISION

Excellence in Electronics

For Raytheon Scan Conversion Brochure, *Write: Director of Marketing, Equipment Division, Dept. A3, Raytheon Company, West Newton, Mass.*





CAE invites your inquiries, and points to past performance as the best indication of what it can do for YOU.

THE R&D CAPABILITIES BEHIND THESE PRODUCTS ARE OPEN TO YOU

When you entrust a research and development project to CAE, you tap a vast reservoir of specialized experience—enlist technical knowhow of a very special sort. CAE's record of accomplishment is typified by, but by no means limited to, the six units shown at the right. Physical facilities implementing its skills are unsurpassed. They include modern-to-the-minute laboratories—computing, electronic, chemical, metallurgical, fuel metering, stress, and component testing—complete environmental facilities—equipment amply adequate for all phases of the job.

CAE is also equipped for a wide variety of subcontracting operations. Detailed information about its production facilities will be sent on request.

CONTINENTAL AVIATION & ENGINEERING CORPORATION

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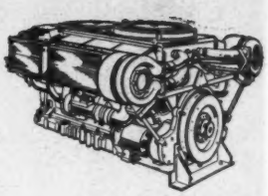

KC-135 tankers are provided, along with the F-105. The staggering B-70 program would be saved by provision of $360 million for development, test, and evaluation. This would replace the $75 million figure suggested by the Administration in the budget estimate and, if it survives, will put the B-70 within months of its original schedule.

Another $50 million is included for work on design of a long-range modern jet transport for MATS. For airlift modernization, there is recommended a fund of $200 million over the budget estimate, with the stipulation that the money must be spent for aircraft for moving Army troops.

The committee also favors spending $3,607,409,000 to improve the capability of our fighter aircraft and $10 million for procurement of Fairchild F-27 turboprop transports. Deleted is an item of $215 million for purchase of Convair F-106 interceptors. The defense weapon emphasis is placed on the Bomarc antiaircraft missile, with $294 million restored after the House took it out on request of the Defense Department.

Major victory for USAF's Lt. Gen. Bernard A. Schriever, ARDC Commander, came in the committee's approval of a $50 million addition to the House-approved $33.8 million for work on the reconnaissance satellite program. The money was earmarked to give General Schriever what he needs: concurrency in the whole program, with provision for the things that will make operational capability a reality. With these funds, it will be possible to have a working system at least a year earlier than Defense Department conservatives have held possible. The step will add genuine urgency to the Midas, Samos, and Discoverer projects.

Floor debate on the Senate committee proposals, held while the tickers were chattering with news of how our President had been routed from his itinerary by some Tokyo Reds, was reasonably curt and sensible. On top of the recommendations there was added $130 million for Army weapons modernization and more men in the Marines. As it went to joint conference with the House, the defense appropriation bill was up $1,299,897,000 above what the Administration feels it needs.

Several senators, including Democrats Lyndon Johnson and Richard Russell, were critical of the tendency of the White House and Budget Bureau to withhold funds after they have been appropriated by Congress. Mr. Russell said it is useless to provide money that will not be used. At this point it appears the wave of abuse and humiliation emanating from the Kremlin will not abate. It also appears that it could loosen some of our pursestrings.

Advice for Bureaucrats

In a capital city that sometimes seems nearly overwhelmed by obfuscation there are rays of light which stand out from time to time. One such glimmer that seems likely to achieve the status of a genuine beam, capable of showing us where we have been and where we ought to go, is the study of National Policy Machinery being conducted by Senator Henry M. Jackson, D.-Wash., who heads a subcommittee of the Committee on Government Operations.

As we have pointed out here before, Mr. Jackson already has come up with some biting comments on the importance of finding the right people to do big jobs in government. Now, in the light of events surrounding the crackup of the summit conference and the sojourn of Pilot Powers in Moscow, he has come up with seven basic principles governing intelligence activities. They merit quotation. They also deserve to be done over, possibly in the form of a catechism, and hung on the office walls of the Washington bureaucracy.

Here they are:

1. The free world needs intelligence activities to assure its survival. Intelligence is as important as armed strength. In this age of push-button weapons, intelligence is more than ever our first line of defense.

2. Intelligence operations are instruments of national policy. They must be subject to effective and continuing higher review and coordination. This includes a weighing of gains against risks.

3. The collection and evaluation of intelligence is a job for professionals. Intelligence organization should be tight, centralized, responsive, and, to the greatest possible extent, anonymous.

4. Officials who depend upon intelligence must be professional in handling the problems which it raises.

5. The conduct of diplomacy must be insulated from sensitive intelligence operations. Intelligence is a source of information for diplomacy—not a part of it.

6. Public revelation of sensitive intelligence is never a harmless act. It both jeopardizes the normal conduct of foreign relations and compromises the sources of vital intelligence. If public statements have to be made at all, they must be made only in response to overriding national interest and on the responsibility and under the control from the outset of one high authority.

7. The golden word of intelligence is silence. More can be lost by saying too much, too soon, than by saying too little, too slowly.

It would be easy, from this list, to draft Seven Deadly Sins and illustrate them from the headlines born at Sverdlovsk on the first of May.

We Can Be First

If you're an old stick-and-rudder enthusiast, your attention should be called to a recent statement by C. R. Smith, President of American Airlines. "We are not doing very well in aeronautical research," he said, "and the course we appear to be taking for the future is not encouraging."

Mr. Smith reports that morale in places like the aeronautical department of the National Aeronautics and Space Administration is not good. The merger of aeronautical research and space technology was brought about, he believes, as a result of the national concern over rocketry and space and the technological race with the Russians. Mr. Smith does not argue against the merger or the necessity for it, but he does lament the neglect that has surrounded more conventional areas.

Said he:

"To devote our attention too exclusively to rockets and missiles, with relative neglect for aeronautical research, would be a policy which will produce tragic disappointments. The total of knowledge in the aeronautical sciences still represents a field in which many of the potentially profitable areas remain unplowed. We have, of course, learned much, but even more lies over the horizon. It is nonsensical to believe that other nations of the world will abandon their aeronautical research. If they do not and we do, our position of world leadership in aviation rests on an unstable basis."

The *Economist* of London has expressed the editorial opinion that if the Russians can produce a supersonic transport the airlines of the world will beat a path to their door. Mr. Smith, clearly, does not want to be a customer; he also is aware that we have the know-how to be first. We need only the determination.

(Continued on page 31)

RestartABLE
April 13, 1960, marks a dramatic milestone in American propulsion technology—the first successful restart of a rocket engine in outer space. The mission, under Air Force Ballistic Missile Division management—launching of the ARPA-Navy Transit navigational satellite into precise orbit. The propulsion system: Aerojet's AbleStar upper stage.
ReliABLE
AbleStar's spectacular achievement carries to a new pinnacle the unrivaled reliability pattern of Aerojet's ABLE series—15 tries, 15 triumphs—in launchings conducted for the Department of Defense and the National Aeronautics and Space Administration.
AvailABLE
Produced by Aerojet-General, under systems management performed by Space Technology Laboratories, the AbleStar was designed, developed, qualified and flown in less than one year from contract inception. Simple, low-cost AbleStar upper stage engines are available now for immediate contributions to America's space programs.
A product of the Aerojet Systems Division
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FIRST RESTART IN SPACE

Dr. Teller Speaks Up

In more than a decade of Washington banqueting we have heard every speaker on the circuit, but none who held his audience more enthralled than Dr. Edward Teller at this year's National Armed Forces Day Dinner. There was not the scrape of a chair, the tinkle of a glass, or a whispered conversation during his remarks in the packed ballroom of Washington's big Sheraton-Park Hotel. The reason lies in the man, his spot in American technological history, his grasp of the menace that faces free people all over the world.

The scientist made an appeal for continued atomic testing, arguing that it is possible to develop good nuclear weapons for limited-war purposes, that these weapons would be defensive, and that they are essential to meet the limited challenges we can expect from the Russians in the future.

He said this work also can contribute to our retaliatory capability by ensuring a cheaper, earlier, more dependable second-strike force.

Dr. Teller also had his note of pessimism: He paid tribute to Russian excellence in technology and predicted that, if present trends continue, they will dominate the world by 1970.

How Many Russians?

A friend whose name we have promised not to mention sends us, from time to time, a news bulletin published by the Executives' Club of Chicago. In a recent issue there was a stimulating exercise carried out by a former Deputy Director of the Office of Strategic Services. He was a speaker before the club, Dr. James P. Baxter, President of Williams College, and a man not renowned for belligerency.

Dr. Baxter said that Wild Bill Donovan, his wartime boss, used to tell the staff to put their hats on backward one day a week and try to think like planners for the enemy. Well, Dr. Baxter did it for the weighty audience he had in Chicago and came up with these results:

1. If the Russians could persuade the free world to scrap its nuclear strength while secretly retaining a nuclear capability of their own, they might count on world mastery.

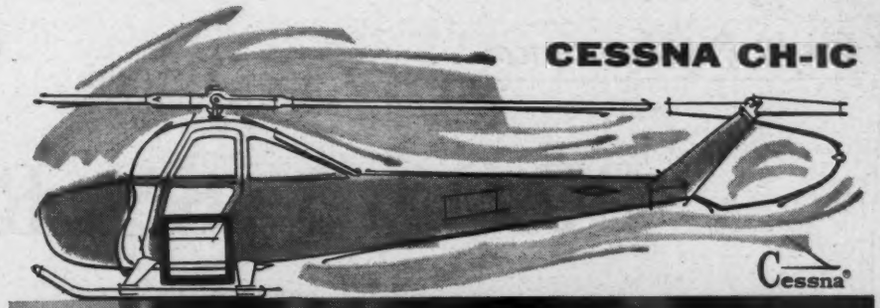
2. If the Russians could persuade the free world to scrap its nuclear strength, even at the cost of scrapping their own, they could dominate the world if they retained superiority in conventional forces.

3. If, by a surprise strike with missiles followed up by manned bombers, they could destroy our Air Force on its bases, our cities would then be at their mercy, and they could write the peace terms at their leisure. True, they would face very heavy losses at home, so heavy at present as to be unacceptable, but we are talking about a nation which killed great numbers of its own people to establish its political system and millions more in order to institute its system of collective agriculture.

Dr. Baxter went on to raise the question: If we fail to deter the Kremlin, how many millions of their own people are the Russians prepared to sacrifice in order that they might master the world?

Besides being a veteran of the OSS, Dr. Baxter has taught American diplomatic history for thirty-five years. He believes Russia aims to dominate the world, by force if necessary, and that the deterrent power of SAC is what has held the peace so far. He did not answer his own question, but there are a lot of people in Russia. We suspect, somehow, that the reply may be in the Gaither Committee Report, which never was released by the White House.

Dr. Baxter wrote it.—END



STABILITY PROBLEM—SOLVED BY CESSNA!

Problem: How to achieve, in a helicopter, *dependable* stability at low upkeep cost. Solution: The *all-mechanical* stabilization systems of Cessna's new multipurpose CH-IC. Eliminating the complexities and uncertainties inherent in traditional electronic stabilization systems, the CH-IC delivers stability with economy-of-maintenance and dependability never before known in helicopter flight.

Mechanical stability is just one of the reasons the 4-place CH-IC is an uncommonly practical aircraft—and one more of the ways Cessna "Problem-Solving" Research is ever at work enhancing America's future in the air.

Military Division CESSNA

Flight Pay Insurance . . .

A PROGRESS REPORT

BY RICHMOND M. KEENEY

INSURANCE DIRECTOR, AIR FORCE ASSOCIATION

THE recent liberalization of AFA's Flight Pay Insurance Program — guaranteeing benefits after the first year without regard to preexisting medical conditions—is a major advance in the program. It has brought us much interested and favorable comment, for which we are most grateful.

Because so many AFA members *have* expressed interest in this new provision, this seems an appropriate time to review the Flight Pay Insurance Program from its beginnings in June 1956 —in terms of what we hoped it would accomplish and what it has accomplished.

Briefly, when AFA pioneered this program, it was our hope that Flight Pay Insurance would provide a way for rated personnel to safeguard their flying income from the hazards of accident and ill health. To a very considerable extent this objective has been accomplished, though not to the degree AFA had originally hoped.

Most AFA members know that the benefit period of the current program is somewhat less generous than the one we had originally planned. In addition, the premium schedule is somewhat more conservative than we had intended in the beginning.

Both of these changes were dictated by seriously adverse loss ratios. There were no reliable guideposts or standards of measurement, and our percentage of claims ran far higher than the best available medical and insurance authorities could have predicted. Fortunately, however, neither of the changes AFA was forced to make caused the original objectives of the plan to be compromised.

Since February 1958, when we were able to reshape the program in the light of experience, it has shown remarkable strength and growth—so much so, in fact, that today nearly one out of every two active-duty AFA members uses this unique plan to insure his flight pay income.

Flight Pay Insurance has drawn some of its strength from within simply because it has met successfully a demonstrated need. Since the plan was inaugurated four years ago, 583 grounded flyers have received monthly indemnity checks for periods ranging from three to twenty-four months. Total benefits of over $1.5 million have been paid to date. Inevitably, the satisfaction and enthusiasm of these reimbursed policyholders has spread and has brought the desirability of this form of income protection into clear focus for many others.

But even this inherent strength would probably not have been enough to maintain, stabilize, and gradually improve the benefits of Flight Pay Insurance without the services of an underwriter, an insurance company, with vision to see the merits of the program and confidence in its eventual success. The Air Force Association was most fortunate that the Mutual Benefit Health and Accident Association (Mutual of Omaha) was willing to assume underwriting responsibility when a change of underwriters became necessary in October 1958.

Mutual of Omaha has been of immeasurable help in allowing AFA plenty of time to work the bugs out of the program and more recently in arranging for the great liberalization of benefits, which affects all groundings since March 1, 1960.

Without question this new feature, which guarantees benefits regardless of previously existing medical conditions after the first year of coverage, offers the insured far more *real* security than has ever before been possible.

Under the old terms of the policy, eighty-four percent of submitted claims were valid and payable. We anticipate that this new provision will raise this figure to ninety-six percent or ninety-seven percent. This benefits policyholders, of course, and also achieves AFA's prime goal for the program—to increase the number of policyholders eligible for benefits. We have always looked at Flight Pay Insurance as a cooperative venture by Air Force pilots to safeguard the flight pay income of not just some, but of every participant.

With this liberalization of benefits, the AFA Flight Pay Insurance Program, now beginning its fifth year of operation, has reached maturity. It stands in a position of acknowledged leadership in the still new field of specialized income protection, and its benefits are based on four years of solid experience.

AFA is proud to have done pioneering work in this field, and we are most grateful to our members whose continued participation, especially in the years while we were still without reliable statistics, has made this program possible. And, as always, we invite your continued interest, your comments, and your participation.—END

Now GUARANTEED Flight Pay Insurance!

A brand NEW benefit at no extra cost . . .

Now AFA Flight Pay Insurance is a better investment than ever, because it offers *guaranteed protection*, even against preexisting illnesses, after the first year's coverage.

There's no extra charge for this new, liberal provision and no change in the regular benefits of the policy—

- *Coverage for* both *illnesses and accidents.*
- *Payments for up to 24 months if your grounding is the result of an aviation accident — up to 12 months if for illness or ordinary accident.*

Remember, payment for a single 90-day grounding reimburses you for the whole cost of 10 years' protection.

NOTE:

All policies are dated on the last day of the month in which the application is postmarked, and protection against accidents begins as of that date; protection against groundings due to illnesses begins 30 days later. Of course, coverage cannot be immediately extended to include illnesses which existed prior to the time you insured your flight pay, but after 12 months you are fully covered against all illnesses.

To be eligible for protection, you must have passed your last annual physical . . . be presently in flying status . . . and be a member of the Air Force Association.

Most claims are routine. Where a difference of opinion exists, the Air Force Association has the right to request a review of medical records and other claim evidence by appropriate medical authorities—normally the office of the Surgeon General, USAF.

There are also some exclusions that affect your coverage under the Flight Pay Protection Plan. They are designed primarily to protect your investment in the Plan—restrictions that you'd normally expect, such as groundings due to insanity, court-martial, attempted suicide, etc. Here they are in detail:

EXCLUSIONS:

The insurance under the policy shall not cover loss to any Member resulting in whole or in part from or due to any of the following:

1. Criminal act of the Member or from injuries occasioned or occurring while in a state of insanity (temporary or otherwise).
2. "Fear of flying," as officially certified by responsible authority of the Member's Service and approved by the head of the Service in accordance with applicable regulations.
3. Caused by intentional self-injury, attempted suicide, criminal assault committed by the Member, or fighting, except in self-defense.
4. Directly or indirectly caused by war, whether declared or not, if act of an enemy in such war is the direct cause of loss insured hereunder, hostile action, civil war, invasion, or the resulting civil commotions or riots.
5. Failure to meet flying proficiency standards as established by the Member's Service unless caused by or aggravated by or attributed to disease or injuries.
6. Inability of a member to continue to meet physical standards for Hazardous Flight Duty because of a revision in those standards, rather than because of preceding injury or disease causing a change in the physical condition of such member.
7. Mental or nervous disorders.
8. Alcohol, drugs, venereal disease, arrest, or confinement.
9. Willful violation of flying regulations resulting in suspension from flying as a punitive measure, or as adjudged by responsible authority of the Member's Service.
10. Suspension from flying for administrative reasons not due to injuries or disease, even though the Member may have been eligible for or was being reimbursed at the time of the administrative grounding because of a previously established disability.
11. Loss of life shall not be deemed as loss for purposes of this insurance.
12. Primary duty requiring parachute jumping.
13. Voluntary suspension from flying.
14. A disease or disability preexisting the effective date of coverage, or a recurrence of such a disease or disability, whether or not a waiver has been authorized by appropriate medical authority in accordance with regulations or directive of the service concerned, *unless the Member was insured under the master policy issued to the Air Force Association for 12 continuous months immediately prior to the date disability (grounding) commenced.*

Underwritten by Mutual Benefit Health & Accident Association (Mutual of Omaha).

CHOOSE EITHER CONVENIENT PAYMENT PLAN. MAIL THE APPLICATION TODAY!

AFA FLIGHT PAY PROTECTION PLAN

AIR FORCE ASSOCIATION • MILLS BLDG. • WASHINGTON 6, D. C.

Send me my Flight Pay Protection Policy.

BILL ME FOR:

$_____ semiannual premium (1% of annual flight pay, plus $1 service charge)

$_____ for full payment of annual premium (2% of annual flight pay)

I ENCLOSE:

$_____ semiannual premium (1% of annual flight pay, plus $1 service charge). Bill me every 6 months

$_____ in full payment of annual premium (2% of annual flight pay)

This insurance is available for AFA Members only ☐ I am an AFA Member ☐ I enclose $6 for annual AFA membership

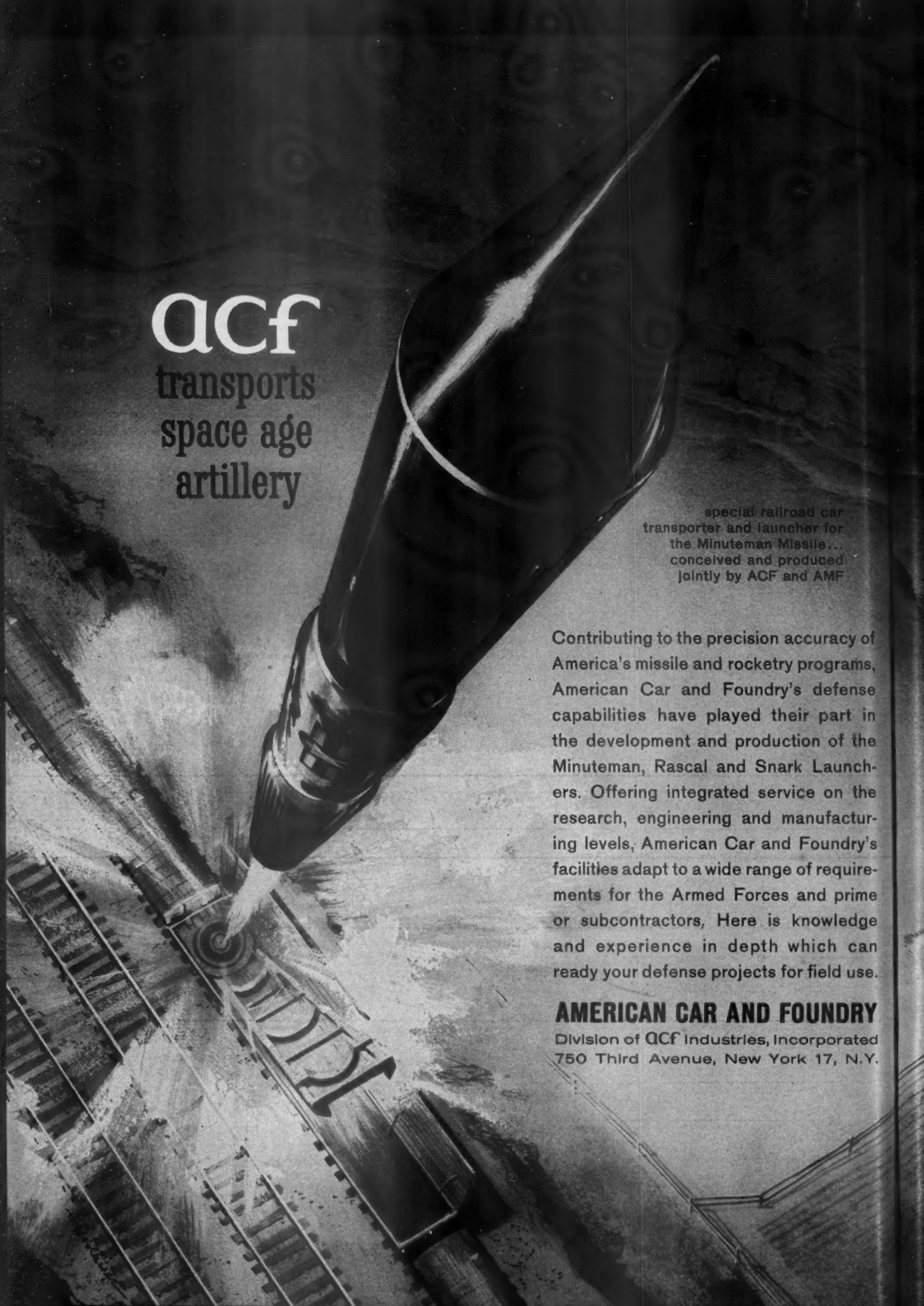
Rank (please print) Name Address

City Zone State $ Annual Flight Pay Years Service for pay purposes

I understand the conditions and exclusions governing AFA's Flight Pay Protection Plan, and I certify that I am currently on flying status and entitled to receive incentive pay and that to the best of my knowledge I am in good health, and no action is pending to remove me from flying status for failure to meet physical standards. I authorize AFA, or AFA representatives, to examine all medical records pertinent to any claim I may submit.

Signature of Applicant Date

Underwritten by Mutual of Omaha 7-60



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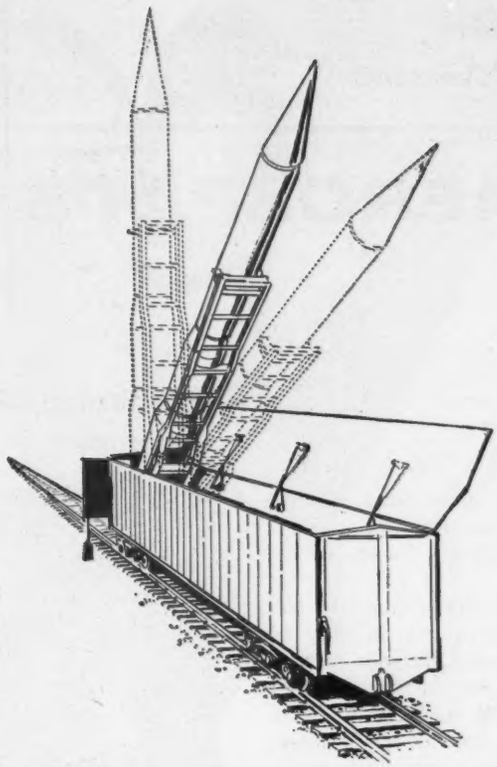

ACF's CHECK LIST FOR DEFENSE PROCUREMENT

☑ **engineering:** American Car and Foundry's engineering staff is trained to design from rough plans, develop the product to meet performance standards and create the processing equipment which will achieve the most efficient production.

☑ **manufacturing:** Five huge plants offer advanced facilities for tooling, heat treating and fabricating both ferrous and nonferrous metals and modern alloys.

☑ **research & development:** From initial drawing to prototype, through pilot or full plant production—sound, modern, workable products.

☑ **quality control:** Every phase of the manufacturing process is inspected by up-to-the-minute equipment and techniques to insure highest standards of quality and performance.

☑ **experience:** Ammunition • Armored vehicles • Propulsion system components • Ground Support equipment • Transportation equipment • Communications hardware • Research and development

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News,
Views
& Comments

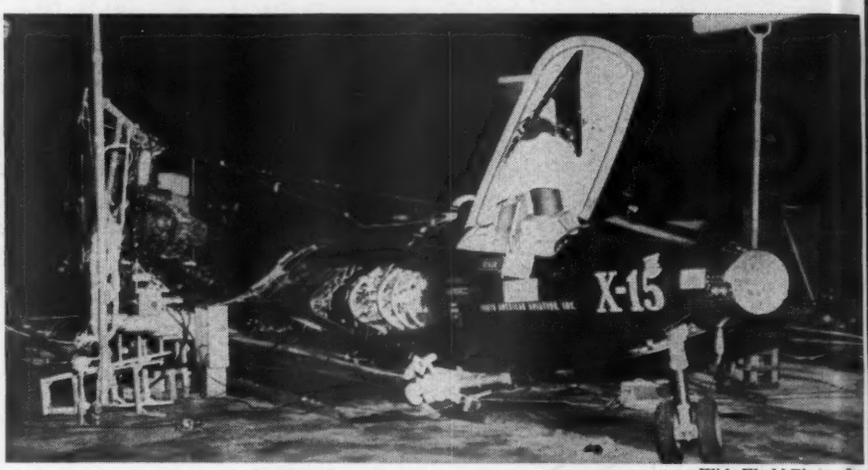
AEROSPACE WORLD

Frederic M. Philips
ASSOCIATE EDITOR

An Air Force pilot won a new-fashioned dogfight this month and prevented a possible disaster in Albuquerque.

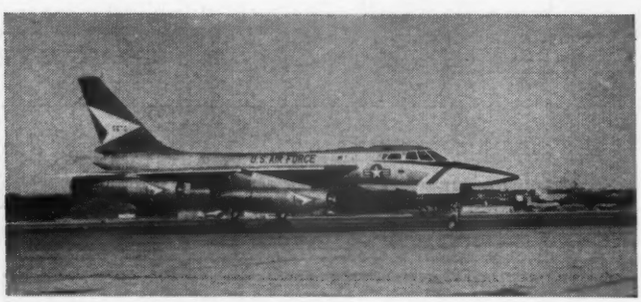
Pitted in peacetime combat over the New Mexican desert on May 14 were: 1) a runaway Matador tactical missile hell-bent for the state's major metropolis, and 2) ARDC Maj. John D. Fowler in his Convair F-106 interceptor armed with Super Falcons.

The Matador, a Martin missile about the size of a small jet fighter, was launched from Holloman AFB, N. M., to take part in an Armed Forces Day show. Shortly after launch, however, the unarmed missile broke away from an intended oval course and pointed its nose toward Albuquerque some 160 miles away.

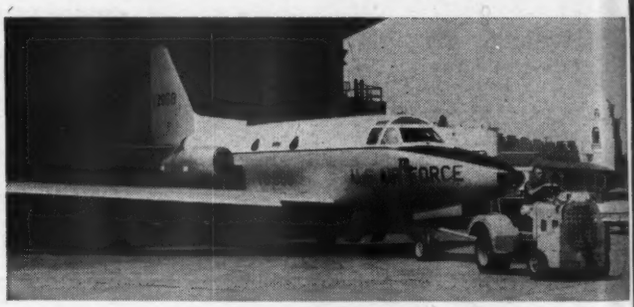


Wide World Photos, Inc.

X-15 aerospace research plane was badly damaged in explosion on June 8 at Edwards AFB, second major accident of program. At controls in a ground test was North American test pilot Scott Crossfield. He escaped serious injury.



New trainer version of Convair B-58 Hustler bomber, to go to SAC, was flown for first time in May. More window space for both trainee and instructor distinguish TB-58.



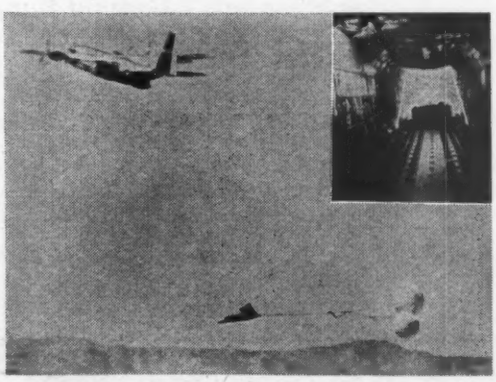
Another training plane on the way to USAF was the North American T-39, also entered into flight test program in May. Plane is first of forty-two on order by Air Force.

The missile, which had been undergoing tests at USAF's Missile Development Center at Holloman for some months, has a self-destruct mechanism for activation from the ground in such circumstances. It is also accompanied in flight tests by a chase airplane.

On this occasion, however, the self-destruct device failed, and the speeding missile got a quick jump on the North American F-100 chase plane.

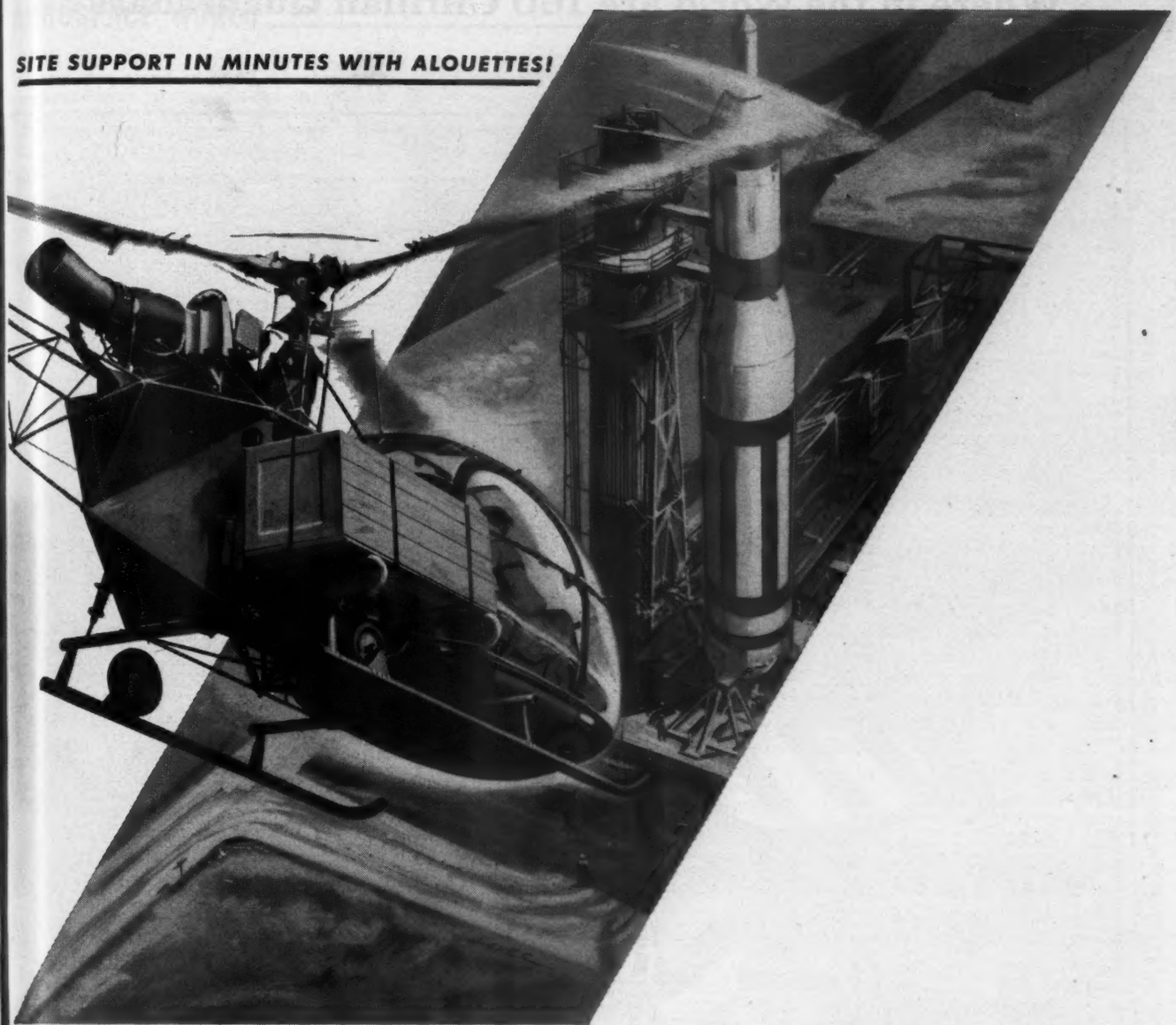
At this point Major Fowler, F-106 test pilot for ARDC, had been air-

(Continued on page 39)



Left, a heavy-equipment drop record is set by a USAF Lockheed C-130 at El Centro, Calif., Navy base on May 12. Plane is seen here just after drop of 35,000 pounds of scrap metal under chutes. Inset is crew's view of drop from within plane.

SITE SUPPORT IN MINUTES WITH ALOUETTES!



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AND THE "MINUTES PHILOSOPHY"

Our defense and offense complex must function in a matter of minutes. Reliable missile site support in "minutes" can be maintained by instant-starting, jet-powered Alouette helicopters, world's only time-proven turbine copter. An Alouette Site Support Program is immediately available to the military—with tested reliability, and low maintenance and operational costs — at ONE-HALF THE COST of comparable programs.*

The Alouette MEANS reliability, ease of maintenance and minimum operational budgets with the advantages of turbine power.

*Designed by Sud Aviation

REPUBLIC AVIATION CORPORATION

HELICOPTER DIVISION

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Where in the World are 160 Gilfillan Quadradars?

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- Canada
- Denmark
- Ireland
- Finland
- France
- Germany
- Israel
- Italy
- North Africa
- New Zealand
- United States

Below, last wartime B-25 bomber is mustered out of the service in May 21 ceremony. Plane had been used as administrative aircraft by SAC at Turner AFB, Ga. It becomes memorial.

Wide World Photos, Inc.

Aviatrix Jacqueline Cochran became first woman to fly at Mach 2 in June 6 hop as passenger in North American's A3J Vigilante Navy attack plane. Here Miss Cochran receives last-minute briefing from plane's pilot before takeoff.

borne for two minutes with two Hughes GAR-3A Super Falcons under his wings. He had completed one pass over a crowd of several thousand persons at the base. Later in the show the veteran pilot was to have conducted mock attacks on the circling Matador.

The range safety officer and mission controller hurriedly departed from the prepared script. They vectored him to a real-life intercept on the missile.

The Matador was racing along some sixty miles north of Holloman, forty-five miles from Major Fowler, when he cut in full afterburner and took out after it. Major Fowler picked up the missile on radar, locked on, switched his Hughes MA-1 fire-control system to full automatic for the target run. Then, after visually identifying the wild-flying bird, he let 'er rip. Both Super Falcons scored direct hits, and the runaway Matador blew apart.

Location of the intercept was but twenty-five miles from Albuquerque. If it had not taken place, five tons of missile could have crashed down into the city.

☆

The Defense Department has set up a single, all-service communications network. To many, it appeared a significant step along the road to true unification of the armed forces.

Pulled into one Defense Communications System by a late-May directive were global facilities that included seventy-nine major relay stations. Virtually all long-line communications within the US armed services were to come under control of a single Defense Communications Agency.

The system, DoD said, will "furnish facilities for command and control functions, intelligence, weather, logistics, and administration." Specifically exempted from the communications reorganization were ground-air-ground, ship-to-ship, shore-to-shore, and other tactical and special radio links.

Chief of the new agency was to be a military officer of general or flag rank, with first chief to be named by early this month. Assumption of control by the agency will take place during the next nine months.

This important move by DoD, it

(Continued on page 41)

APPARATUS DIVISION

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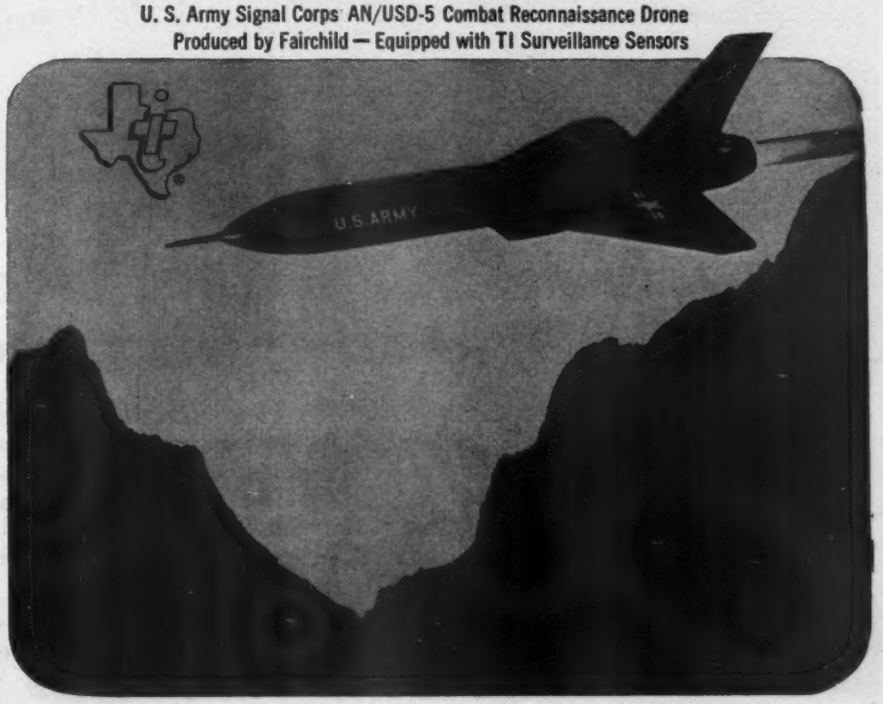
TI IN SURVEILLANCE SYSTEMS

U. S. Army Signal Corps AN/USD-5 Combat Reconnaissance Drone
Produced by Fairchild — Equipped with TI Surveillance Sensors



...NEWS IS HAPPENING AT NORTHROP

This thirty-first parachute decal denotes the successful completion of as many surveillance missions. Informally dubbed "Repeater" by its crew, this is not an unusual SD-1. Many Radioplane SD-1 drones have exceeded "Repeater's" record, because Radioplane designs these systems to be rugged, simple, and *reliable*.

ARMY'S SD-1 RACKS UP 31 MISSIONS ...READY FOR 31 MORE!

At the Army Electronic Proving Ground, Fort Huachuca, Arizona, tough little SD-1 drones from Radioplane perform mission after mission training troops in the tactical use of drone aerial surveillance. Under the direction of the U.S. Army Combat Surveillance and Target Acquisition Training Command, they are launched and return with photo intelligence within minutes. The SD-1 serves our tactical organizations in the U.S. and overseas in Europe and the Far East.

Reliability is the keynote in Radioplane design whether the product is a tactical SD-1 drone like "Repeater," a target missile, or a landing system for a space vehicle.

PILOTLESS AIRCRAFT
FOR AERIAL SURVEILLANCE
FOR TARGET TRAINING
FOR WEAPON SYSTEM EVALUATION

RADIOPLANE
A Division of **NORTHROP CORPORATION**
Van Nuys, California, and El Paso, Texas

was widely noted, could indicate the way the unification wind is blowing at the Pentagon. In this connection, also known to be under comprehensive study in DoD was an Air Force proposal for creation of a single US strategic force to include land, sea, and aerospace systems.

☆

A wide range of missiles and aircraft made hardware news this month. Most of it was good.

★ Atlas set a new missile distance record with a 9,000-mile flight from Cape Canaveral to the Indian Ocean on May 12. Longest previous shot, 7,800 miles, was by a Russian "superrocket" in the Pacific January 20. Two days after that, Atlas had taken its longest previous ride, 6,325 miles.

★ Another Atlas went 5,000 miles from the Cape using inertial guidance alone on June 11—first free-world ICBM to do so. On May 6, the second attempted shot of an Atlas from a new "coffin" launcher at Vandenberg failed. The first such effort succeeded on April 22.

★ Titan performed 5,000-mile, full-range tests on May 13 and 27, and informed sources said its development appeared back on schedule to attain combat readiness by the end of this year.

★ Maj. Bob White took X-15 number one to an altitude of 107,000 feet, highest so far for the test plane, on May 19 at Edwards AFB. Number one is first of three X-15s built by North American and the only one thus far turned over to USAF and NASA.

★ The second bad accident of the X-15 program took place on June 8. A hydrogen-peroxide tank blew up while North American test pilot Scott Crossfield was at the controls of plane number three in a ground test. The explosion badly damaged the plane, but Crossfield escaped injury as he had in crash-landing number one last fall.

★ Bomarc air defense missiles had a banner month at Eglin AFB on Florida's Gulf Coast. Bomarc-As intercepted at least eight high-flying drone missiles in stepped-up testing. Bomarc-B scored a simulated success on May 17, its second after eight flops. The A models are sited at four bases in the northeast. One missile exploded and burned in an accident at McGuire AFB, N. J., on June 8. There were no casualties. An insignificant amount of radiation was said to have been released.

★ In further missile activity, two Quail radar diversionary missiles went for a satisfactory test trip from a B-52 over the Gulf on May 14. Also, on June 3 a Martin Mace, follow-on to a Matador, achieved its twelfth straight impressive outing over the Atlantic.

★ On the aircraft front, USAF claimed a new world record for a heavy-equipment parachute drop when a Lockheed C-130 Hercules dropped 35,000 pounds in one bundle over the desert within the naval air station at El Centro, Calif., on May 12. A British RAF plane held the old mark of 31,000 pounds. Cargo in the bundles, dropped under 100-foot diameter chutes, was scrap metal.

★ Meanwhile, first production model of North American's T-39 two-jet trainer, on order for USAF, entered flight tests. A trainer version of the Convair B-58, to go to SAC, similarly made its first flights.

☆

Vandenberg AFB's primary concern is the "big birds." But lesser members of the animal kingdom also provide their share of problems.

Capt. Duane Robinson, base flight safety officer, and Maj. William Stringer, who holds the improbable title of base game warden, have dealt with them by the herd, covey, and ton.

More than a thousand deer roam Vandenberg's 86,000 acres. At one point, three separate herds of thirty to forty deer each settled in the base airstrip area. They were a hazard to planes coming in to land. The two officers solved that one by hoisting burlap "flags" dipped in deer repellent around the strip. The repellent, has the scent of mountain lion, enough to make any sensible deer keep his distance.

In addition to deer there are wild pigs, bobcats, coons, a few mountain lions, foxes, skunks, and a wide variety of birds that also call Vandenberg home. Birds and rabbits were everywhere when the base was first reactivated a few years ago, but jets and missiles scared them out of the airstrip-missile pad traffic pattern. One missile crew reported that a mountain lion, apparently far from frightened by the goings on, was seen on closed-circuit television padding about a pad during a launch countdown.

The Vandenberg missilemen have held a few major hunts, reminiscent

(Continued on page 43)

Environmental testing of TARmac ASR-4 Airport Surveillance Radar System, developed and produced for the Federal Aviation Agency.

TI IN HEAVY RADAR SYSTEMS

APPARATUS DIVISION

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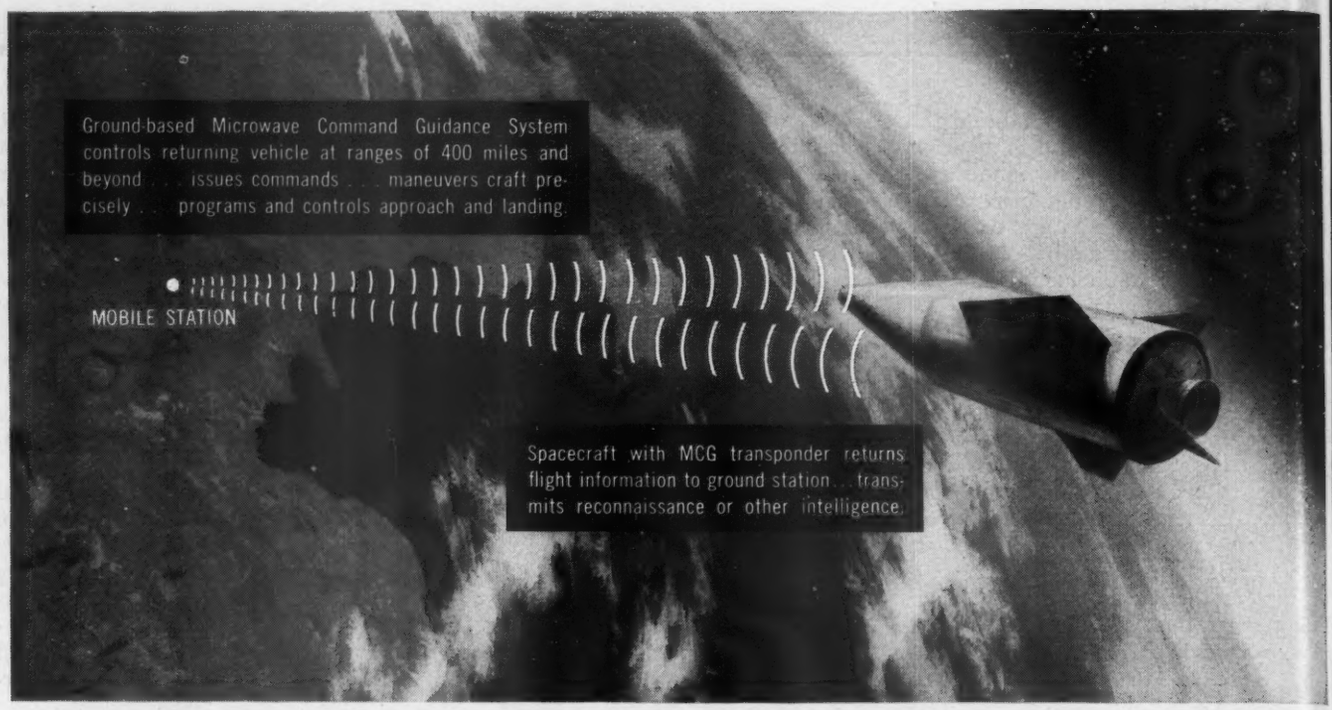
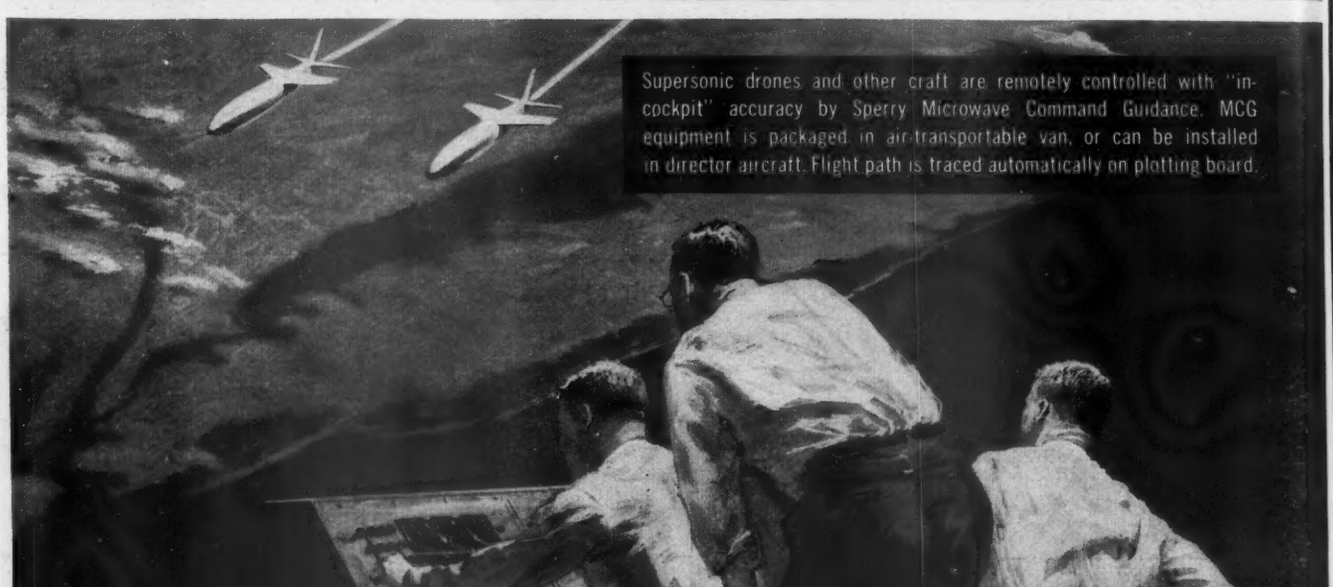

Ground-based Microwave Command Guidance System controls returning vehicle at ranges of 400 miles and beyond . . . issues commands . . . maneuvers craft precisely . . . programs and controls approach and landing.
MOBILE STATION
Spacecraft with MCG transponder returns flight information to ground station . . . transmits reconnaissance or other intelligence.


Supersonic drones and other craft are remotely controlled with "in-cockpit" accuracy by Sperry Microwave Command Guidance. MCG equipment is packaged in air-transportable van, or can be installed in director aircraft. Flight path is traced automatically on plotting board.

How Sperry Puts Spacecraft "On Instruments"

SPERRY 50 YEARS 1910 1960

One of the big questions in returning spacecraft to earth—how to "steer" with precision—is being answered by Sperry. Sperry's Microwave Command Guidance System, developed with the Air Force, will fly any kind of vehicle remotely 400 miles and beyond, exercising levels of precise control far beyond the ability of a skilled pilot.

Sperry Microwave Command Guidance can establish the optimum approach path and provide accurate landing control. It issues high-speed commands, monitors performance, plots course, transmits intelligence in both directions. It can control any reconnaissance vehicle, as well as returning spacecraft, and is ideal for test-range instrumentation applications.

Already proven in remote control of supersonic vehicles, MCG is a compact, mobile package in an air-transportable van . . . can also "go airborne" to avoid terrain problems and extend range. Write for system information pertinent to your project.

SPERRY PHOENIX COMPANY, *DIVISION OF SPERRY RAND CORPORATION, PHOENIX, ARIZONA*

of the vain hunt for a bear seen at Andrews AFB last year, but the bag in each case was negligible.

Biggest single wildlife problem at Vandenberg was a whale. The multi-ton corpse washed ashore near an Atlas pad. Major Stringer, the game warden, supervised its burial.

☆

A distinguished body of business, professional, and military leaders this month urged the United States to seek eventual international arms control—but to keep its powder dry in the meantime.

Delegates to a four-day "Strategy for Peace" conference at Columbia University's Arden House, New York, declared in a statement of recommendations that arms controls are "an essential means of enhancing national security and international peace." To attain this end, it called on the US to:

- Maintain and develop its military strength with the realization that "arms controls and armaments are not contradictory, but rather complementary aspects of a responsible national security policy."
- Establish a high-level, interdepartmental government staff to study "all aspects of arms control."
- Place before the United Nations a recommendation for establishment of an international "corps of experts" to "study and assess the methods and techniques of arms control."
- Encourage and support work by universities, foundations, research centers, and other private institutions engaged in "research relating to the strategy of peace" and security.

"We are impressed by the need for basic research and planning in the entire arms-control field—including the military, political, diplomatic, legal, economic, and technological facets of the problem," the group said in suggesting creation of a staff including experts in each of these areas.

Attention, the statement said, "should be divided between the urgent short-range problems of maintaining strength and security in a world threatened by war, and on the other hand, the long-range problems of eventually creating a system of world security against war."

Some 130 persons, including AIR FORCE/SPACE DIGEST Editor John F. Loosbrock, took part in the four days of discussions and presentations. They represented universities, foundations, government agencies, the armed forces, publications, and industrial firms.

The hope was that this "Strategy for Peace" parley and its successors might make a real contribution to global peace and security. The delegates voted to hold another such gathering within a year.

☆

ELSEWHERE IN THE AEROSPACE WORLD:

★ The Senate, acting under pressure of renewed cold war, boosted President Eisenhower's defense budget by more than a billion dollars in mid-June. The money bill that went to a joint Senate-House of Representatives committee for further adjustment stood at $40.5 billion. Included in the increase was a vital $285 million rise for the previously gutted B-70 program. The plane, with advanced subsystems, was restored to full development status.

Also included in the boost were funds for development of Bomarc-B missiles and further Bomarc sites, which would have suffered seriously under earlier House action. The Senate in addition voted money for new airlift, a new aircraft carrier for the Navy, eased a House-ordered cut in money for pilot proficiency flying. The Upper House made up some of the money to be thus expended by cutting back the House appropriation for airborne alert and new fighter-interceptors for ADC.

★ Russia launched a four-and-a-half-ton space vehicle bearing a "dummy spaceman" on May 15, first major Soviet space feat since the October 4, 1959, launch of an "automatic interplanetary station" satellite.

★ The Air Force put a two-and-a-half-ton experimental Midas early-warning satellite into orbit on May 24. When operational, Midas satellites will use infrared scanning to spot and report launches of enemy missiles.

★ USAF's last World War II B-25 bomber departed from the active inventory on May 21 in a ceremony during Armed Forces Day observances at Eglin AFB, Fla. The plane had been used as an administrative aircraft by SAC's Brig. Gen. A. J. Russell at Turner AFB, Ga. It was turned over to the mayor of Valparaiso, Fla., near Eglin, to be placed in a park there. Four of the USAF Tokyo Raiders, the men who bombed Tokyo in 1942 in B-25s from the carrier *Hornet*, flew into Eglin in the last plane as part of the plane's retirement. The Valparaiso park will be

(Continued on page 45)

CENTAUR (A United States Space Vehicle) will report back through TI-built FM/FM telemetry.

TI TELEMETRY
IN MISSILE SYSTEMS

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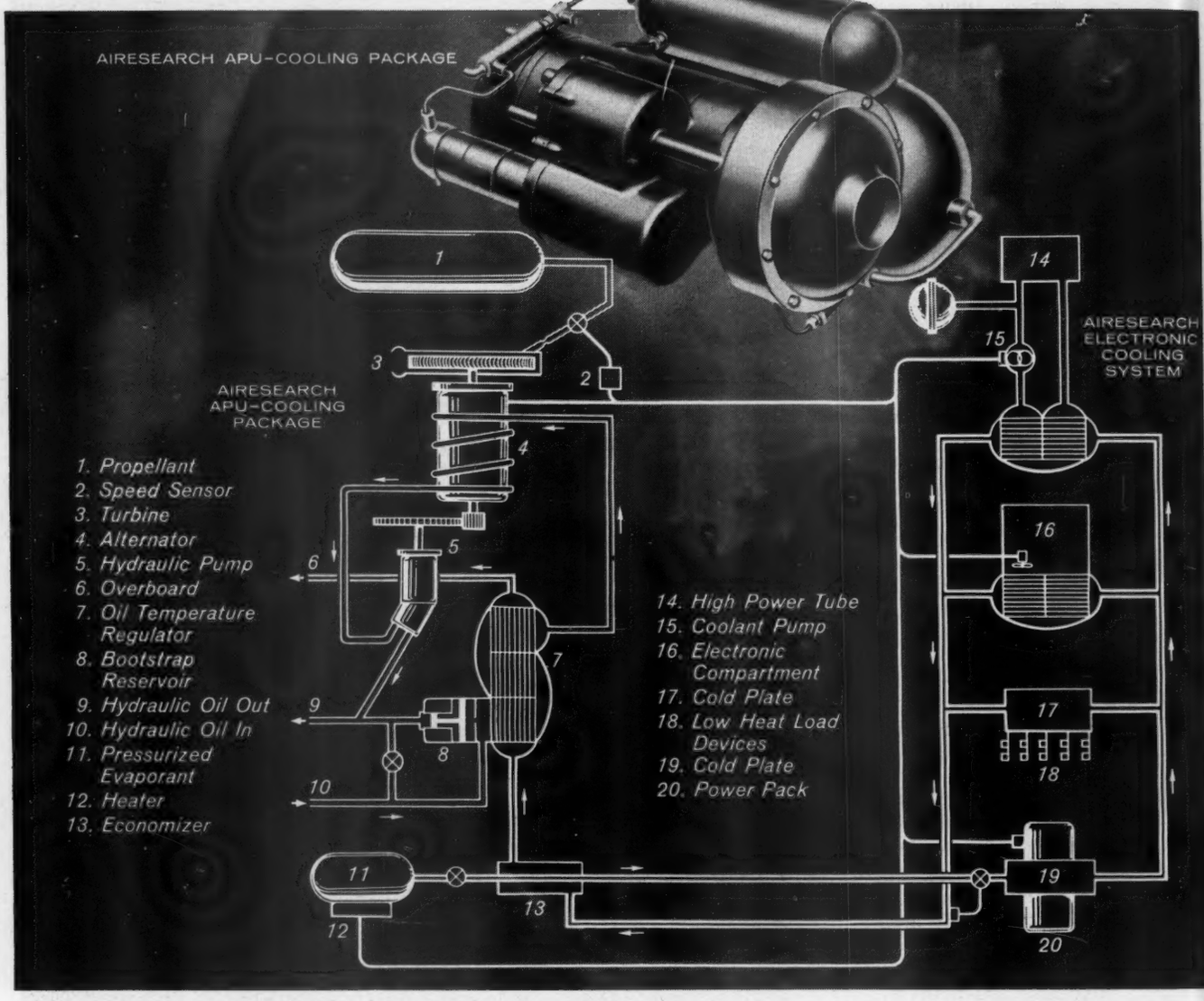
Integrated accessory power and cooling system



meets the most advanced missile and space vehicle requirements

AiResearch has developed a *single* system package for missiles and space vehicles to meet increasing accessory power and cooling load requirements in the face of decreasing size and weight allowances.

This integrated accessory power and cooling system supplies hydraulic power for actuating systems, 3200 or 400 cycle three-phase electric power for guidance and control, and at the same time provides cooling both for the APU and all electronic equipment operating in the missile or space vehicle.

The cooling system in the example shown here uses liquid ammonia as the expendable evaporant, and each heat load area has a separate temperature control valve. Alternator and controls, turbine assembly and APU liquid propellant fuel tank are patterned after operationally proven components.

World leader in the design and manufacture of cooling and accessory power systems, AiResearch has delivered more missile APUs than any other company, and is the leader in advanced electronic cooling systems for aircraft, missiles and spacecraft.

AiResearch design and manufacturing experience in these two fields includes: liquid and solid propellant APUs; hydraulic and hot gas actuators and control systems; 3200 and 400 cycle alternators; cold plates; expendable and closed cycle gas and liquid cooling systems; cryogenic cooling systems.

Please direct inquiries to Los Angeles.

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AiResearch Manufacturing Divisions

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Systems and Components for: AIRCRAFT, MISSILE, SPACECRAFT, ELECTRONIC, NUCLEAR AND INDUSTRIAL APPLICATIONS

named for Jimmy Doolittle, who led the Tokyo raid.

★ On May 20, immediately in the wake of the U-2 incident and the still-born Paris summit meeting, Red fighter planes forced down a USAF C-47 over East Germany when it strayed across the Iron Curtain in a routine run from Copenhagen to Hamburg. Aboard were seven men and one woman passenger. The plane and all aboard were released unharmed four days later.

★ A TAC Composite Air Strike Force (CASF) of 120 jet fighters and transports streaked to Thailand in early June in a quick-deployment exercise.

★ USAF revealed on June 2 that the first squadron of Minuteman ICBMs to be stationed at Malmstrom AFB, Mont., will have fifty-five missiles, contrasting sharply with the nine to twelve missiles each that will go to Atlas and Titan squadrons. Minuteman will be both a hardened and a mobile, railroad-mounted system. Trial rail runs in this regard began late in June.

★ The Navy sent a fifty-story balloon into the stratosphere on June 5 from Brunswick, Ga., in a continuing study of cosmic ray particles. The balloon also took an unscheduled free flight over the southwest.

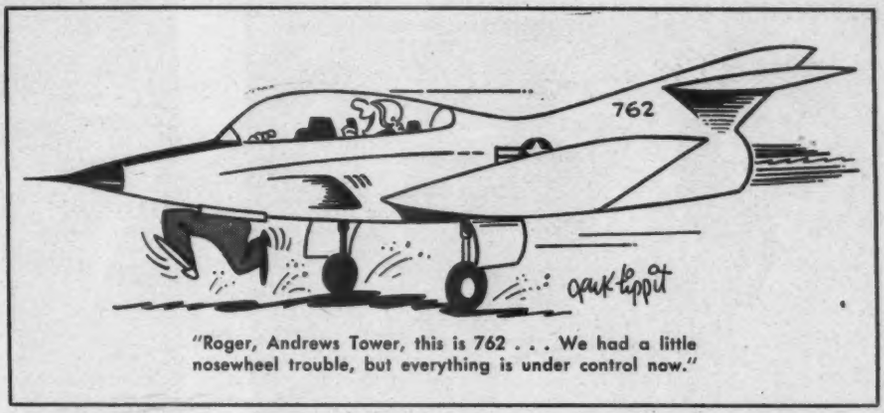
★ Union machinists struck at Atlas bases including Vandenberg and the Cape on June 6. The strike was aimed against Convair, makers of the missile, but brought missile site construction to a temporary standstill across the country and caused postponement of two launches in early June.

★ USAF announced on June 9 that B-47s would shortly start to operate from civilian and non-SAC service bases in dispersal training.

★ One civilian technician was killed and nine others injured in an accidental explosion during Titan ground-handling operations at the Cape on June 14. This was the first known missile accident fatality since the start of test activities more than a decade ago.

★ Jimmy Doolittle and six other distinguished persons in the fields of science and industry received Air Force Exceptional Service Awards for meritorious service to the nation at a meeting of USAF's Scientific Advisory Board on April 20. This is the highest award the Air Force gives to persons not in uniform.

★ USAF's third annual Koren Kolligian Award for notable performance in a flight emergency went this year to 1st Lt. Ronald L. Warner of the Pacific Air Forces for bringing a crippled, passenger-laden C-119 in to a safe landing at Iwo Jima last September.



"Roger, Andrews Tower, this is 762 . . . We had a little nosewheel trouble, but everything is under control now."

★ Maj. Gen. Joseph D. Caldara, USAF's first Deputy Inspector General for Safety, moved to a new duty station July 1. He became Chief of MAAG and the Joint US Military Group in Spain.

General Caldara has played a considerable role in the compilation of USAF's excellent over-all safety record in the past few years. He entered the safety business as Director of Flight Safety Research in 1955, last year became Deputy IG to head a single office charged with responsibility for the nuclear, missile, ground, and flight safety programs.

Successor to the post is Maj. Gen. Perry B. Griffith, former Commander of TAC's 836th Air Division. His headquarters will be at Norton AFB, Calif., General Caldara's location until new quarters were set up in Washington last year. General Caldara succeeds Maj. Gen. Stanley J. Donovan in Spain.

(Continued on following page)

U. S. Navy S2F-1 antisubmarine aircraft, produced by Grumman — equipped with TI-built AN/APS-38A surface search radar, and AN/ASQ-8 magnetic anomaly detector.

TI RADAR & MAGNETICS IN ANTISUBMARINE SYSTEMS

APPARATUS DIVISION

TEXAS INSTRUMENTS INCORPORATED
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This year's Koren Kolligian Award for performance in a flight emergency went to 1st Lt. Ronald L. Warner, PACAF, for safe handling of crippled C-119 last fall. Here Gen. Curtis E. LeMay presents trophy at Pentagon during May.

Former MATS Commander Lt. Gen. William H. Tunner, center, received Distinguished Service Medal from Chief of Staff Gen. Thomas D. White in May retirement ceremony. Here they chat afterward with Rep. Mendel Rivers (D-S.C.).

STAFF CHANGES. . . . **Brig. Gen. Horace D. Aynesworth,** from Deputy Commander, Field Command, Defense Atomic Support Agency, Sandia Base, N. M., to Commander, 837th Air Division, TAC, Shaw AFB, S. C., effective August 1. . . . **Maj. Gen. Charles J. Bondley,** from Director of Supply and Services, DCS/M, Hq. USAF, to Director of Logistics Division, J-4, European Command, effective August 23. . . . **Brig. Gen. Homer A. Boushey,** from Assistant for Advanced Technology, DCS/D, Hq. USAF, to Commander, AEDC, ARDC, Tullahoma, Tenn.

Brig. Gen. Allman T. Culbertson, from Deputy Commander, AFMDC, ARDC, Holloman AFB, N. M., to Director of Systems Management, WADD, ARDC, Wright-Patterson AFB, Ohio, effective July 22. . . . **Brig. Gen. Richard D. Curtin,** Deputy Commander, Space Programs, AFBMD, ARDC, Los Angeles, Calif., to Deputy Director of Systems Development, DCS/D, Hq. USAF.

Maj. Gen. Marvin C. Demler, from Director of Research and Development, to Director of Systems Development, DCS/D, Hq. USAF. . . . **Maj. Gen. Gabriel P. Disosway,** from Commander, 17th AF, USAFE, to Senior AF Member, Military Studies and Liaison Division, Weapons Systems Evaluation Group, Washington, D. C. . . . **Maj. Gen. Stanley J. Donovan,** from Chief, MAAG, Spain (also Chief, Joint US Military Group, Spain), to Deputy for Operations, Hq. TAC, Langley AFB, Va., effective August 1. . . . **Brig. Gen. John Dougherty,** from DCS/Intelligence, to DCS/Personnel, Hq. ARDC, Andrews AFB, Washington, D. C. . . . **Brig. Gen. Leo F. Dusard, Jr.,** from Commander, 3615th Pilot Training Wing (Basic), ATC, Craig AFB, Ala., to Deputy Chief of Staff for Technical Training, Hq. ATC, Randolph AFB, Tex.

Maj. Gen. James V. Edmundson, from Deputy Director to Director of Personnel Procurement and Training, DCS/P, Hq. USAF. . . . **Brig. Gen. Thomas R. Ford,** from Commander, 837th Air Division, TAC, Shaw AFB, S. C., to Deputy for Operations, Hq. 9th AF, TAC, same base, effective August 1. . . . **Brig. Gen. Francis C. Gideon,** from Director of Transportation, to Director, Data Systems, Hq. AMC, Wright-Patterson AFB, Ohio. . . . **Maj. Gen. Perry B. Griffith,** from Commander, 836th Air Division, TAC, Langley AFB, Va., to Deputy Inspector General for Safety, 1003d Inspector General Group, Hq. Command, USAF, Norton AFB, Calif., effective August 1.

Maj. Gen. Victor R. Haugen, from Director of Development Planning, DCS/D, to Assistant DCS/D, Hq. USAF. . . . **Maj. Gen. Albert G. Hewitt,** from Director of Logistics Division, J-4, European Command, to Assistant to Commander, Hq. Command, USAF, Bolling AFB, Washington, D. C., effective September 21. . . . **Maj. Gen. Joseph R. Holzapple,** from Director of Systems Management, to Commander, WADD, ARDC, Wright-Patterson AFB, Ohio. . . . **Maj. Gen. Lloyd P. Hopwood,** from Director of Personnel Procurement and Training, DCS/P, Hq. USAF, to Commander, Chanute Technical Training Center, ATC, Chanute AFB, Ill., effective August 9.

Maj. Gen. William B. Keese, from Deputy Director of Military Personnel, DCS/P, to Director of Development Planning, DCS/D, Hq. USAF. . . . **Brig. Gen. William G. Lee, Jr.,** from Chief of Staff, Taiwan Defense Command, Air Task Force 13, Provisional, 13th AF, PACAF, to Commander, AF Intelligence Center, 1126th USAF Field Activity Group, Hq. Command, USAF, Arlington, Va., effective September 1. . . . **Brig. Gen. Richard P. Klocko,** from Commander, 6900th Security Wing, USAFSS, APO 757, N. Y., to Deputy Commander, USAFSS, Kelly AFB, Tex., effective August 1. . . . **Brig. Gen. Melvin F. McNickle,** from Director of Research, Development, and Engineering, DCS/Research and Engineering, to Assistant DCS/Research and Engineering, ARDC, Andrews AFB, Washington, D. C. . . . **Maj. Gen. Troup Miller, Jr.,** from Commander, AEDC, ARDC, Tullahoma, Tenn., to Vice Commander, Air University, Maxwell AFB, Ala.

Brig. Gen. Norman L. Peterson, from Acting Commander, to Commander, AWS, MATS, Scott AFB, Ill. . . . **Brig. Gen. Douglas C. Polhamus,** from Assistant to the DCS/O, to Deputy Chief, Defense Atomic Support Agency, Hq. USAF. . . . **Brig. Gen. William E. Rentz,** from DCS/Installations, USAFE, to Assistant to Commander, Hq. Command, USAF, Bolling AFB, Washington, D. C., effective October 1. . . . **Maj. Gen. Henry R. Spicer,** from Deputy Commander to Commander, 17th AF, USAFE. . . . **Maj. Gen. Prescott M. Spicer,** from Deputy Director of Programs to Director of Programs, DCS/P-P, Hq. USAF.

Maj. Gen. Robert H. Terrill, from AF Member, Joint Strategic Survey Council, JCS, Washington, D. C., to Commander, APGC, ARDC, Eglin AFB, Fla., effective September 1. . . . **Maj. Gen. Herbert B. Thatcher,** from Chief, MAAG, Germany, to AF Member, Joint Strategic Survey Council, JCS, Washington, D. C., effective August 1. . . . **Brig. Gen. Robert H. Warren** is the new Commander, APGC, ARDC, Eglin AFB, Fla. . . . **Brig. Gen. Ralph L. Wassell,** from Deputy Director of Research and Development, DCS/D, to Director of Research and Technology, DCS/D, Hq. USAF. . . . **Maj. Gen. Harold E. Watson,** from Deputy Assistant Chief of Staff, Intelligence, Hq. USAF, to DCS/Intelligence, Hq. ARDC, Andrews AFB, Washington, D. C. . . . **Maj. Gen. Stanley T. Wray,** from Commander, WADD, ARDC, Wright-Patterson AFB, Ohio, to Director, SAF Personnel Council, OSAF, Hq. USAF, to become effective July 20.

RETIRED. . . . Maj. Gen. John B. **Ackerman,** Brig. Gen. William J. **Clinch,** Maj. Gen. Eugene P. **Mussett,** Lt. Gen. Oliver S. **Picher,** Brig. Gen. Harold L. **Smith.**—END

NEW Hamilton Standard Hi-Lo Starter System

Can give aircraft complete operational flexibility ...long, reliable starter life...at a fraction of the cost of any combustion system

Simplest system for conversion—Nearly fifty per cent of the B-52's in service, for example, are presently equipped with Hamilton Standard MB-10 low-pressure pneumatic starters—the basic unit of the new Hi-Lo system. The other half utilize a different pneumatic starter that could be easily replaced by the Hi-Lo system. Result: The entire B-52 fleet can be easily retro-fitted with the Hamilton Standard Hi-Lo system for as little as one-tenth the cost of any applicable new combustion system.

Complete operational flexibility, simplest logistics—The Hi-Lo system operates on low-pressure air from cross-bleed or standard MA-1A ground cart. It will also operate on high-pressure air from ground cart or inexpensive airborne or ground bottles, that can be charged by MC-1, MC-1A, or MC-11 ground carts. All these carts are in widespread use, today.

Lowest operating costs—Because the Hi-Lo system operates on cool air, it is not subject to the rapid deterioration of high temperature combustion systems. Result: The Hi-Lo system will deliver up to twice as many starts before overhaul—and without costly special fuels.

Safe, reliable—Tests show the Hi-Lo starter provides a high degree of reliability and safety under *any* inlet condition.

Short lead time—Hamilton Standard's Hi-Lo starter system is fully developed, field-tested, and available on short lead-time basis—now!

STARTER SYSTEMS ARE ONE OF THE MANY FIELDS OF GROWTH AT HAMILTON STANDARD TODAY

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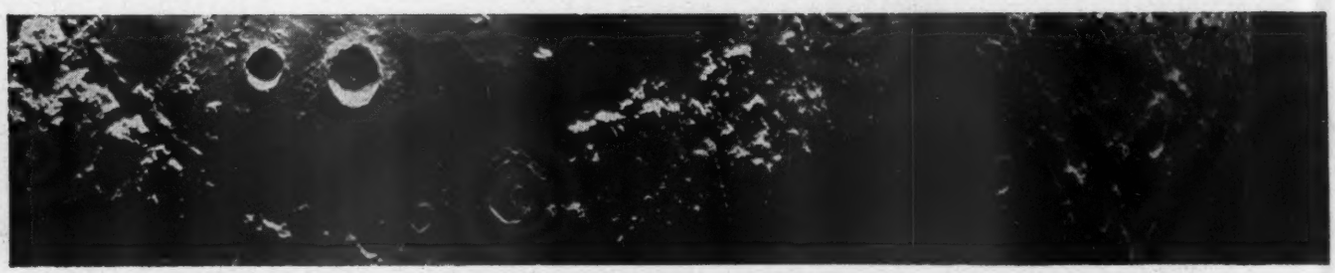
To the moon and back and wherever missiles fly. Librascope computers deliver ready answers for in-flight control ■ guidance, optimum trajectories, impact prediction, data reduction and analysis. Throughout flight... Librascope missile computers are uninterrupted by environmental extremes... and they will automatically and continuously check their own built-in accuracy. The compact size, minimum weight and performance of Librascope missile computers have earned them important roles in our conquest of space. For information on how Librascope advanced computer capabilities can answer your particular needs, write to Librascope, 808 Western Ave., Glendale, Calif. ■ Librascope, A Division of General Precision, Inc. ■ For information on engineering career opportunities, contact Glen Seltzer, Employment Mgr.



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GPL LI 0-1

Controlled Peace

THE REAL LESSON OF THE U-2

A SPECIAL ANALYSIS

My soul, be not disturbed
By planetary war;
Remain securely orbed
In this contracted star.
—"Address to My Soul," Elinor Hoyt Wylie, 1928

TO THE many millions of Americans, including more than a few in high government positions, who have thus been addressing their souls ever since Sputnik I roared into the cosmos, recent events have come as a rude shock.

Our government officially admitted sending the high-flying U-2 over Soviet territory in search of information vital to the security of this nation and, indeed, to that of the entire free world.

The President of the United States was publicly and raucously insulted and vilified by the head of the Soviet government.

An American citizen, Francis Gary Powers of Pound, Va., was to stand trial for his life in a Moscow court, accused of espionage.

The "Peace" in our national slogan of "Peace and Prosperity" began to flicker like a burned-out neon sign as the world's nerves grew raw with tension.

A thin veneer of realism was added, if only for a moment, over the thick layers of complacency within which the country has been hibernating these past several years.

And we of Air Force/Space Digest began to hear echoes of familiar phrases—"the threat of surprise attack," "the urgent need for reconnaissance," "satellite warning systems." Yes, even "controlled peace."

Perhaps the fate of Pilot Powers and the rocket-rattling histrionics of Khrushchev have finally succeeded in amplifying what we at times feared was a voice crying in the wilderness of national self-delusion.

Certainly the atmosphere has changed, and for the better, on Capitol Hill. "Why do you think you need it?" was transformed overnight into, "How much do you need?"

At this writing it looks as though Midas and Samos, the spaceborne successors to the U-2, will get a healthy push with new money, and the B-70 shows signs of rising phoenixlike from the budgetary ashcan.

All of this is good, and perhaps the U-2 accomplished more in its final failure than it had done in all its previous successful flights. But maintaining popular support in a democracy for complicated, expensive, poorly understood military projects is a little like building a fire with green wood. It will burn, all right, but it takes a lot of blowing, and if you stop blowing the flame quickly dies.

(Continued on following page)

Let us therefore examine the lessons of the U-2 while the evidence is fresh and the public interest keen.

To begin with, the need which prompted this nation to undertake the unprecedented reconnaissance flights over the sovereign territory of a country with which we are nominally not at war has diminished not an iota. The danger of surprise attack from intercontinental ballistic missiles is as clear and present as it was two months ago. The demise of the U-2 project only increases the twofold requirement—for warning and reconnaissance systems that will tell us that an attack is coming, and for command and control communications systems that will allow us to do something about it in time.

As AIR FORCE/SPACE DIGEST Publisher James H. Straubel put it in these pages in his March editorial on "Controlled Peace," earthbound and airborne methods for accomplishing these ends are, at best, "only expedients."

"We continue to live under the gun. Only in space —with our new line of sight—can we employ an electronic alarm system to effectively warn against surprise attack."

Our promise to cease the U-2 flights over the Soviet Union only underscores this statement, by removing one of the major expedients to which Mr. Straubel referred.

At this point it is well to recall that the U-2 was a fully operational system, which furnished information on a planned and regular basis. Its spaceborne replacements are still in the development stage, a good way yet from being operational. So, until Midas, Samos, and a communications satellite system attain operational status we face, in addition to the well publicized and officially admitted missile gap, an intelligence gap as well.

What counts is the date at which these systems become usefully operational, not the date at which isolated successful test shots are achieved. And herein lies the great lesson of recent weeks—the pointed differences between exploratory shots in the interest of pure and peaceful science and the kind of operational capability that the military requirement demands of its space systems.

First, the military requirement demands that a space system operate on a continuous basis. A warning system or a reconnaissance system or a communications system is worthless if it is not available at what Gen. Bernard A. Schriever likes to call "the unpredictable instant of need." Hence, you need backup satellites, boosters, and launch facilities, so that a malfunctioning satellite can be replaced immediately, almost like a burned-out spark plug.

Next, a military space system requires a number of satellites in orbit simultaneously in order to obtain full coverage. (This is particularly true in the case of Midas, where a fully integrated system is required to obtain any useful results whatsoever.)

In addition, the components must be standardized, not tailor-made; they must have a high degree of reliability for long life; they must be simple enough to achieve what is called a "blue-suit capability," that is to say, they must be operated by Air Force crews on a day-in, day-out basis, rather than requiring hand-picked teams of scientists.

As General Schriever told a Senate committee a few weeks ago:

"A satellite is no good just floating around the earth in orbit unless you have ground stations to go with it that take the information and data from the satellite and pipe it into the necessary operational commands that will use it.

"So when I am talking about an operational system, I am talking about ground stations, personnel trained to operate those ground stations, the development of the facilities, and instrumentation that goes with it."

Thus we cannot expect to fill the intelligence gap created by the demise of the U-2 program merely by speeding up the development cycle of individual satellites. We must turn to the same concept of concurrency which proved itself so convincingly in the intercontinental ballistic missile program.

The additional money voted by the Senate, if it survives conference with the House, will allow the concept of concurrency to be followed. The next question is whether the Department of Defense will allow the Air Force to spend enough of the money quickly enough to carry out the will of the Congress and thereby achieve an operational capability an estimated year ahead of current schedules.

Up to now the history of DoD support of concurrency as applied to military space systems is not encouraging.

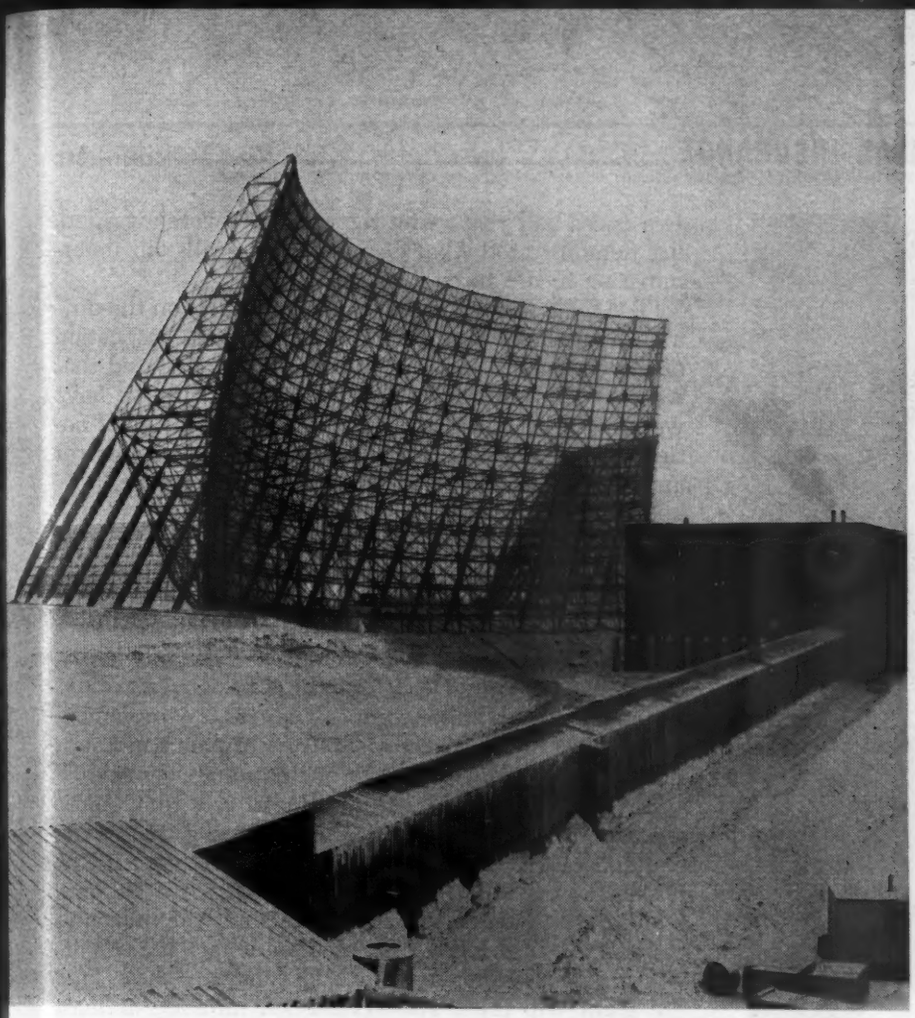
As has become normal, the opposition is based primarily on fiscal grounds, maintaining that each component of a system must be individually tested before "pouring operational money into such a rathole." Such an approach, paradoxically, does not necessarily save any money. It only stretches out the expenditure over a longer period of time, often to the point that the system is then canceled on the grounds of obsolescence.

Surely the U-2 incident and the torpedoing of the summit meeting has taught us the folly of buying dollars with time.

We are at a crucial point in our space-age career. A smidgen of boldness, a modicum of imagination, a tiny tug of leadership can pay incalculable dividends. For beyond the needs of the moment lies the prospect of a world truly at peace, with the possibility of eventually easing the armament burden without opening the door of weakness to an aggressor.

Remove the danger of surprise attack and you pull the fangs of those bent on world conquest. With warning, reconnaissance, and communications systems based in space you provide the best insurance that ballistic missiles will never be fired either in attack or in retaliation. Positive protection against surprise attack combined with the sure threat of retaliation can indeed offer the world its first hope for intelligent, purposeful reduction of armament.

Peace, with justice—and enforcement. "Controlled Peace." This is why we go into space, not merely "to see what's there."—END



"BMEWS has worked even before it gets on the air," declares a USAF colonel. Here, one of four antennas at Thule, now undergoing final test, will be operational by end of 1960.

The Air Force is throwing an electronic curtain across the top of the world. The radar stations of the Ballistic Missile Early Warning System (BMEWS) facilities, of staggering size and complexity, are calculated to provide at least fifteen minutes of warning in the event of enemy missile attack. Their cost is a most reasonable . . .

FIRST PREMIUM ON OUR SURVIVAL INSURANCE

Claude Witze
SENIOR EDITOR

THULE, GREENLAND

My opinion is that the true deterrent posture which we must have is composed of:

- *Carefully designed military forces sufficient in both quantity and quality to destroy the enemy's war-making capacity and will to fight.*
- *The national resolve and determination to maintain such military forces and to use them if necessary.*
- *Recognition by the potential enemy that this combination of strength and determination exist and are credible.*

—GEN. THOMAS D. WHITE, USAF CHIEF OF STAFF

THE newest and possibly most advanced component of our deterrent posture in being is a complicated electronic monster built by the United States Air Force on an icy crag here 600 miles north of the Arctic Circle. BMEWS—the Ballistic Missile Early Warning System—will contribute heavily to each of the requirements listed to the left by General White.

It can be argued that BMEWS, with a total price tag in the billion dollar area, already is paying for itself and that the outlay represents only an initial premium on the free world's survival insurance for the missile age. There are BMEWS supporters who contend that the system, which will not be fully operational at Thule and other sites in Alaska and the United Kingdom until at least 1962, is adding substantially to the credibility of the deterrent right now. They believe this first installation, which will be operational only

(Continued on following page)

Outside construction is almost completed at Thule. Above, four detection radar antennas, each 400 feet long and 165 feet high. Note rugged Greenland terrain in background.

Early-warning information from three BMEWS sites that curtain the top of the world will feed back to NORAD, SAC Headquarters deep within North American land mass. Sites are under development in Greenland, Alaska, Britain.

two and a half years after the contracts were awarded, has demonstrated what General White calls our determination to use force if necessary.

"BMEWS has worked even before it gets on the air," a USAF colonel said during a recent press inspection of the Greenland facility. "We have demonstrated that we are willing to invest heavily to make sure we have warning of an ICBM attack. That investment gives notice that we intend to preserve our retaliatory power and that we intend to use that power if need be."

For all the staggering size and complexity of the BMEWS installations, their very construction in this inhospitable climate representing a triumph over nature, they do not utilize a new technique. Radar is old in this racing technology. But BMEWS is radar on a scale that overwhelms everything that has gone before, even the 3,000-mile DEW Line built to carry warnings of the manned bomber threat. It also is a complementary system to the space-oriented surveillance methods that are becoming so vital to our national security.

BMEWS will send huge curtains of electromagnetic waves out up to 3,000 nautical miles over Russia, parts of Asia, and Europe. The waves will detect ballistic missiles aimed at the United States, Great Britain, and Southern Canada. In a matter of seconds the mechanical brains of BMEWS will calculate where the missile was launched from, where it will land, and how long the flight will take. The system will provide at least fifteen minutes of warning to North American Air Defense Command Headquarters in Colorado Springs and Strategic Air Command Headquarters in Omaha, Neb. Until NORAD has some kind of missile defense system the major value of the BMEWS warning system will be to SAC, giving it time to get its runway alert crews off the ground, thereby increasing the certainty of retaliatory action.

The curved, stationary BMEWS antennas are bigger than a football field, 165 feet high and 400 feet long. There are four, designed to withstand winds of 185 miles an hour and temperatures down to sixty-five degrees below zero. But the generation of the most pow-

BMEWS: One of the Largest USAF-Industry Projects

BMEWS is one of the largest USAF-industry team projects ever undertaken. It involves more than 2,900 industries and suppliers in twenty-nine states.

Prime contractor is the Missile and Surface Radar Division of the Radio Corporation of America, Moorestown, N. J.

Major subcontractors include:

Detection radars: General Electric Company, Heavy Military Electronics Department, Syracuse, N. Y.

Data-processing equipment: Sylvania Electric Products, Inc., Needham, Mass.

Tracking radar: Goodyear Aircraft Corporation, Akron, Ohio.

The Service Company Division of RCA installed equipment on the Thule site and will initially operate the station for USAF. It will perform the same service for the site in Alaska. In England, at Site III, RCA Great Britain, Ltd., will represent the prime contractor.

Western Electric Company has a separate prime contract with USAF for the rearward communication system, linking the three sites and NORAD Headquarters at Colorado Springs.

RCA has subcontracted sixty-six percent of its prime contract. More than thirty-six percent of the total dollars go to small business. General Electric has utilized 450 subcontractors, forty-two percent of them classified as small business. These firms have collected forty-four percent of the dollars allocated to GE.

The Army's Corps of Engineers is supervising design and construction of the buildings at Thule and Clear, Alaska. The British will supervise the one in England.—END

USAF's BMEWS program involves a myriad of statistics. Some idea of the immensity of the program can be gathered from this inventory, provided by the Electronic Systems Center of the Air Materiel Command:

ITEM	SITE I (Thule, Greenland)	SITE II (Clear, Alaska)	SITE III (Fylingdales Moor, U. K.)	ZI	TOTAL
Transistors	315,000	297,000	139,000	30,000	781,000
Tubes	33,000	32,000	100,000	110	165,110
Cabling (in miles)	300	260	240	12	812
Internal wiring (in miles)	1,375	1,090	750	45	3,260
Soldered and crimped connections	14,000,000	11,500,000	10,000,000	500,000	36,000,000
Weight of equipment (in statute tons)	26,400	17,300	6,500	1,400	51,600
Cost	$499,935,000	$327,640,000	$114,600,000	$9,155,000	$951,330,000

erful radar beams in the world and the interpretation of what they see involves an even more gigantic indoor project.

There are four radar sets to provide the curtain broadcast from the Thule site alone. They include 290 cabinets of electronic equipment, ten monitoring consoles, eight high-speed scanning switches, 704 feedhorns—which look like a monster pipe organ—and 440 miles of connecting cables and wave guides. In action, the feedhorns throw narrow bands of energy at the antennas, scanning them so that the reflections form two horizontal detection fan-shaped beams one above the other.

The power is measured in multimillion watts, equal to that generated by 100 large radio broadcasting stations. It can reach as far as 3,000 nautical miles and detect a nose cone no larger than a barrel. It first will see the nose cone when it passes through the lower beam and the pulses bounce back and are detected. Both position and velocity of the missile will be known instantly. Seconds later, as the missile passes through the upper beam, there will be new measurements of position and velocity. Because the missile already has burned out its power source and is in a ballistic trajectory, the BMEWS electronic brain can calculate the impact area and when it will strike. Automatic processing of a missile attack, from the moment the computer recognizes a mass raid to display of the threat at NORAD and SAC, takes about eight seconds. Individual missiles can be discriminated and reported in three seconds.

In the BMEWS project new emphasis has been put on electronic reliability to make sure the operation is continuous. On a tour through the facility, a visitor gets the impression that almost as much engineering effort and electronic equipment has gone into the operational insurance factor as into the parts that actually perform the mission.

There are three approaches to ensure reliability. First, the equipment is designed to require minimum repairs and permit fast maintenance. Second, duplicate equipment is installed in areas where nearly instant replacement of components is not possible. Third, there is an elaborate system of control and switching equipment and checkout and automatic monitoring equipment. This permits an endless examination of the

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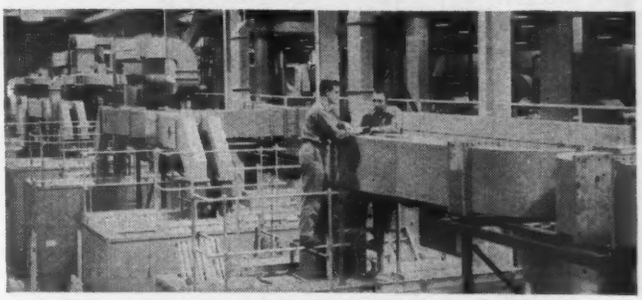
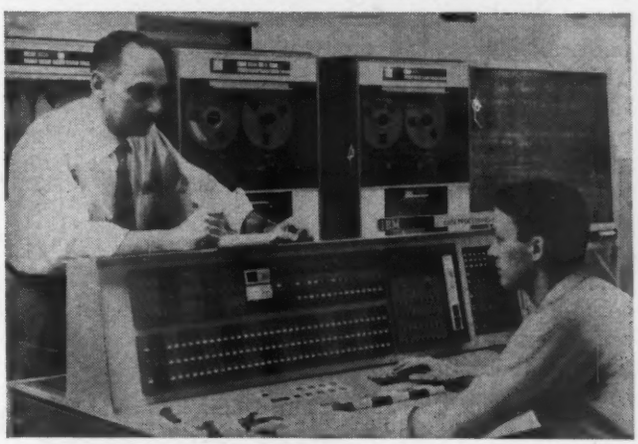


Above, product service technicians inspect massive gear at Thule site. BMEWS radar looks huge, impressive from outside, actually involves more gigantic indoor project.



Running checkout tests on equipment in data-processing phase of BMEWS, which includes general purpose computer apparatus operating at highest speeds available today.

Below, Air Force officer, contractor's engineer take a look at Thule's automatic checkout and monitoring system, which keeps continual "eye" on functioning of the site.

electronic labyrinth for both flaws and potential flaws. The automatic monitoring, much of it continuous, is carried out by punch cards and targets simulated on magnetic tape.

Even before actual design and development of BMEWS was started there were many basic studies to fix the requirements. It was necessary, for example, to analyze the possible paths that ballistic missiles might follow from launch points behind the Iron Curtain to critical target areas in North America. There was one analysis that involved examination of 101,500 separate trajectories, their relationship to each other, and their relationship to the BMEWS design.

Another problem was discrimination. The launching of a satellite, for example, or a shower of meteors demanded spoof-proof equipment. This required study of how these other objects in space would appear to the radar; in effect, there was an analysis of their "handwriting" in the lower cosmos or a recording of their "fingerprints." All of this information is recorded in the monster brains of BMEWS and give it a discriminatory power essential to accurate information.

The electronic data-processing equipment—sometimes labeled the "BMEWS nervous system"—has two main components in addition to its monitorship for reliability and plain calculation of target information.

The actual radar "observer" is called the Detection Radar Data Take-Off subsystem (DRDTO). It is the first three-dimensional device of its kind, estimating azimuth, range, and velocity. With this data, it can perform 200,000 mathematical operations each second. This is the point where the conventional radar operator, staring at a screen in a darkened room, is replaced by a machine. The machine is necessary because it must be on the alert around the clock, it must deal with a gargantuan amount of space in a flash, it must process a vast amount of information at speeds that can deal with the supersonic rate of approach that characterizes the ICBM. The DRDTO, in brief, is a computer that can analyze radar echoes—including extraneous noise returns—detect potential missiles when they are there, and pass the information on to another computer for further analysis.

The other computer is called the Missile Impact Predictor Set (MIPS). This computer, similar in many ways to those used in laboratories and business, can store information in its "brain." The information is in the form of both data and instructions. MIPS, then, can do these things:

- Recognize, among radar sightings reported by DRDTO, those which appear to resemble space trajectories or orbits.
- Discriminate, picking out the ones which resemble potentially hostile missiles.
- Predict points and times of impact.
- Keep a record of the traffic and help make a decision on whether or not the sighting constitutes a mass enemy attack.
- In fractions of a second, put traffic totals, points, and times of impact together in graphic form for the display facilities at NORAD Headquarters.

Getting the word to NORAD from Thule, later from Clear, Alaska, and the BMEWS station in England, is done over alternate routes to ensure reliability. There is a submarine cable system from Thule to Cape Dyer to Newfoundland, which connects with commercial lines to the west and south. The cable is the first ever laid in Arctic waters. A second route uses a tropospheric-scatter radio system from Thule to Cape Dyer and then to Goose Bay, Labrador. From there it goes, also by commercial facilities, over cable, tropospheric-scatter radio, and microwave line-of-sight radio to NORAD Headquarters and SAC. There will be a similar dual routing from the Clear site. Communication from the Fylingdales site in England will be over British postal service circuits and then commercial cables.

Maj. Gen. Clyde H. Mitchell, Chief of the Air Materiel Command's Electronic Systems Center at Hanscom Field, Mass., emphasizes that BMEWS has been approached as a weapon system, so far as USAF management is concerned. This management concept, first used for aircraft, then missiles, now is being applied successfully to electronic systems. The effort, General Mitchell says, is to achieve a single electronic environment that can serve all weapon systems, manned and unmanned, conventional and unconventional. An "electronic gap," he points out, can be as serious as any other "gap" in the defense effort because so many elements depend on electronic capability.

BMEWS is the first electronic system designed purely for the missile age. It will give maximum possible warning of any mass missile attack on North America or Great Britain. The approach does not provide mobility, as can be achieved with an airborne or space system, but it probably has a higher degree of reliability than a satellite warning setup can achieve for several years.

At the same time it always will be an accurate complementary detection system, even in the day when space vehicles sense danger before the threat gets to the BMEWS radar beams.

"In buying BMEWS," said a top Pentagon USAF general, "we have paid the initial premium on survival insurance for the missile age. There are other insurance policies coming up, but this one will be first in being. It will contribute to the deterrent posture, and that posture is USAF's prime concern."—END

Tug tows Navy power plant ship, which will supply power to BMEWS site, into harbor at North Star Bay off Thule.

COMPATIBILITY IS THE KEY

to systems effectiveness and reliability, no matter what the application. And your assurance of compatibility is the systems engineer— trained and experienced in all phases of component, sub-system and systems design. Vitro specialists now provide **systems engineering** for: underwater weapon systems... missile ship weapon systems...fleet ballistic missile systems... data systems...test range systems. These engineers conceived, designed and developed the world's first underwater wire-guided weapon system— the Mark-39 torpedo, its director, fire control and associated equipment. They now provide systems engineering for all tactical air-defense missile ships and Polaris FBM submarines authorized for the Navy's missile fleet.

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Photos by Lou Hollis, Washington Daily News

Above, a homeless youngster waits on Puerto Montt, Chile, airstrip, to board USAF Globemaster which airlifted him to Santiago and safety. Gripping his pathetic sack of belongings, the boy left behind him memories of a shattered city where scenes like the picture below of damage in Puerto Montt were commonplace after the series of earthquakes in Chile during late May.

The homeless and the hungry, their land shattered by earthquakes, queued up on the incredible "airstrip" and waited for the USAF flight to safety. This was but one scene from the moving drama that was the . . .

MERCY AIRLIFT

William Leavitt
ASSOCIATE EDITOR

TO CHILE

SANTIAGO, CHILE

THE earthquakes—the Chileans call them *terremotos*—were a dull but painful memory now. The refugees were on their way by giant Air Force C-124 Globemaster to Santiago and safety.

We were an hour out of Puerto Montt, which with other South Chilean cities and coastal settlements had been shattered by the series of upheavals that rocked the country May 21 and 22. With other correspondents, I accompanied the massive intercontinental US airlift that brought hundreds of relief personnel and tons of supplies to the stricken country. I spent a day and a night in Puerto Montt, talking with the victims, seeing the crumbled homes. Now I was flying the refugee airlift with MATS back to Santiago.

A tired Chilean mother had just fed her five-year-old daughter a meal of inflight canned tuna fish and peaches given her by a MATS crewman. He had dug into his own rations to help feed the forty-six refugees on our flight. Now she was asking me:

"How much, please, for the lunch?"

I answered in high-school Spanish.

"Nada, señora. . . . Nada. . . . Nothing. . . . Courtesy of Uncle Sam."

I told the MATS crew the story, and tired eyes brightened. These men had been working nearly round the clock on the mercy airlift. But you could see that the special nature of their assignment was allowing them to trade in deep fatigue for deeper pride as they guided the Globemaster northward over rugged Chilean terrain to the capital. There relief officials awaited planeloads of refugees from the south.

Dreadful tremors, quakes, and tidal waves had rendered thousands of South Chileans homeless the week before. Needed quickly and in great quantity were food, medical supplies, trained personnel, blankets against the cold of winter. Chile's seasons are the reverse of ours.

On May 23, the US Ambassador to Chile cabled Washington with an outline of needed assistance. By May 25, emergency funds were okayed, and by five o'clock the same afternoon, the Air Force was alerted for what rapidly developed into the greatest emergency mercy airlift in history.

Before another six hours had passed, the first Douglas C-124 Globemaster out of the MATS EASTAF base at Dover, Del., was landing at Pope AFB, N. C., where it took on personnel and supplies of the Army's 15th Field Hospital out of Fort Bragg. This was one of two Strategic Army Corps field hospitals that had been alerted for en masse shipment to the Chile disaster area. The second field hospital and its personnel, the 7th, out of Fort Belvoir, Va., was airlifted from Andrews AFB, Md., on May 26.

That first C-124 was the vanguard of sixty-eight missions (as of June 3, when the situation in Chile began to clear) flown by MATS in the emergency airlift. Some of the figures as of that date: 780 tons of supplies carried an average distance of 4,500 miles; average one-way flight time, twenty-five hours; 677 personnel airlifted. Flight plan: States to Panama for refuel; on to Lima, Peru, for fueling; on to Santiago.

Included in the cargoes were some 113,000 pounds of medical supplies, a dozen helicopters, thousands of blankets, 140,000 pounds of rations, plus communications equipment. Heaviest chores were handled by the C-124s. Backup was by MATS Douglas C-118s.

Participating MATS crews were from the 1608th Air Transport Wing at Charleston AFB, S. C.; the 63d Troop Carrier Wing at Donaldson AFB, S. C.; the 1611th Air Transport Wing at McGuire AFB, N. J.; and the 1607th Air Transport Wing at Dover AFB, Del. The joint Air Force-Army effort (Navy MATS crews helped, too) was coordinated by the Caribbean Command Joint Task Force organized for the emergency, working with regular US missions to Chile.

Getting there—as far as Santiago—was only half the job. The landing of large aircraft, especially as the planes poured into Santiago Airport, was difficult. To coordinate logistics and traffic control at Panama, Lima, and Santiago, the Air Force had to fly in specialist teams, spare parts, and night-landing aids.

From Santiago, one entire Army field hospital, the 15th, was flown into Puerto Montt, plus supplies at regular intervals. The C-124 flights into Puerto Montt's emergency airstrip, a single, uncharted, unlighted concrete runway, prompted MATS crews to remark that they had to break every rule in the book. USAF and Chilean planes were parked at one end of the strip, outgoing refugees crowded the other end. C-124s braked in on the proverbial dime on each touchdown. Chilean Air Force liaison personnel helped guide tired MATS crews in and out of the incredible airport. C-124s landed, offloaded, and took off posthaste. With no lights on the field, flights back to Santiago had to take off before darkness.

In other areas, such as badly hit Valdivia, US Army medics and Chilean relief personnel had to trek by train and truck for more than twenty hours to bring in aid. Fort Belvoir's 7th Field Hospital, assigned to Valdivia, made the hazardous land trip. Some coastal settlements, reportedly destroyed by tidal waves, were meanwhile air surveyed by Chilean Air Force C-47s. Private aero-club craft brought in supplies wherever disaster survivors could be sighted.

Once going, the airlift from the States grew to a torrent. And although the situation seemed to have eased as June came, there were new dangers of flooding in some areas, and the need for aid continued. Resupply as long as needed from the States was the order of the day at MATS Headquarters at Scott AFB, Ill. Many of the MATS personnel who had barely rested from Big Slam/Puerto Pine, the recent Puerto Rican exercise (*see* AIR FORCE, *May '60, "The Gap in Our Military Transport"*) and who had flown the Chilean lift, had their work cut out for weeks more.

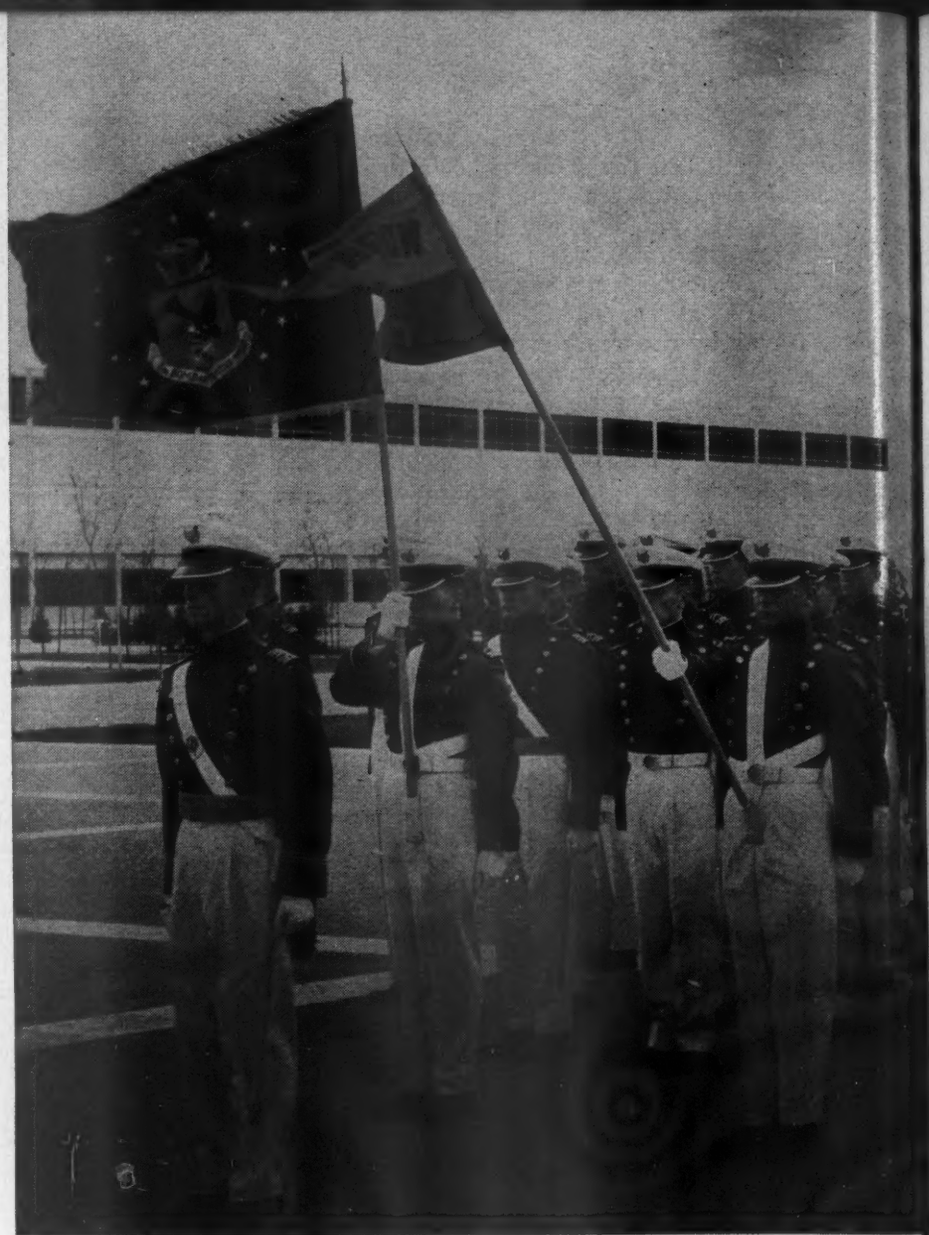
And as I talked it over with the MATS crew that carried me back to the States, some of the old-timers recalled that Operation Amigo was the *second* US mercy airlift to Chile.

Back in January 1939, a similar disaster had visited the Chilenos. A "giant" XB-15 flew supplies in from the States. A miracle then. A miracle now.—END

One of the major events of June Week at the Air Force Academy is presentation of the Air Force Association Trophy to the Cadet Honor Squadron. This year's award, given at the Academy's Organizational Awards Parade, went to the 7th Squadron . . .

'THE CREAM OF THE CREAM'

Ed Mack Miller



A proud moment for the Cadet Honor Squadron and its Commander, Cadet Lt. Col. Richard J. Hillman, at the Organizational Awards Parade. Large colors are those of the Squadron's sponsoring USAF unit, SAC's 7th Bombardment Wing.

THE scene was breathtaking, dramatic, meaningful. Emerald-green grass contrasted with the dress uniforms of some 1,400 Cadets deployed in precise ranks across the parade ground of the Air Force Academy.

Rising behind were the handsome, pale granite buildings of the Academy. In a second, higher wave of color, the pine- and spruce-covered Colorado Rockies reached into the distance.

It was 1400 hours on June 4, 1960. One of the major events of the Academy year, presentation of the Air Force Association Trophy to the Cadet Honor Squadron, was taking place.

The trophy is presented annually at the Organizational Awards Parade, which kicks off June Week activities.

At the end of June Week come graduation and commissioning, which this year fell on June 8.

As the three-foot-high Air Force Association award was being presented to Cadet Richard J. Hillman, Commander of 7th Squadron, the Honor Squadron, a middle-aged woman standing in the vicinity of the reporter whispered, "They're really the cream of the crop, aren't they?"

"No," answered a gentleman with her. "That's 7th Squadron. They're *the cream* of the cream of the crop."

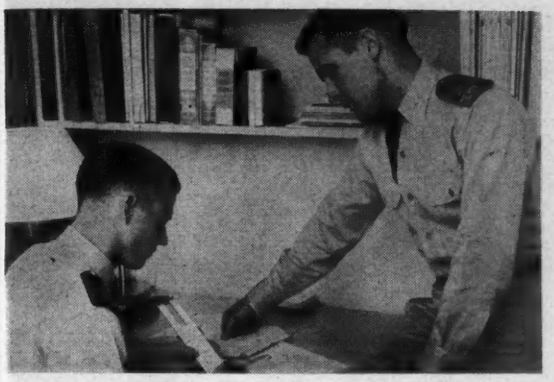
The hushed exchange rendered a fitting characterization of the Squadron AFA honored this year.

On June 2, the Honor Squadron had been feted by the Air Force Association, sponsor of the trophy, at Colorado Springs's Garden of the Gods Club. Nearly 150 persons attended.

The master of ceremonies was Milton Caniff, AFA member and creator of the "Terry and the Pirates" and "Steve Canyon" comic strips.

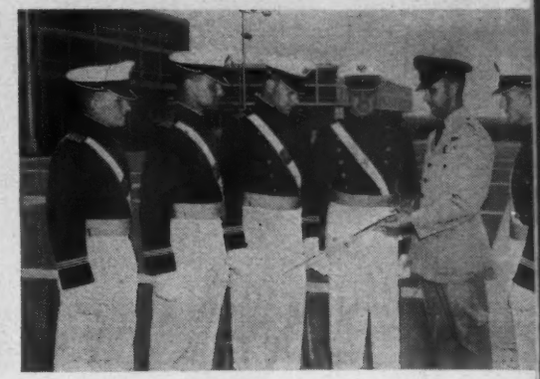
Special guests, in addition to the members of the Honor Squadron and its Squadron AOC (Air Officer Commanding), Maj. Earle H. Ambrose, were the Academy Superintendent, Maj. Gen. William Stone; Gen. Laurence S. Kuter, NORAD Commander in Chief; visiting senior officers from various Air Force commands; Air Academy professors; and Air Force Association members from neighboring Colorado cities.

Speakers at the banquet included the Academy



Squadron Commander Hillman, seated, and Cadet Sidney Newcomb, Squadron Commander last fall, discuss math problem in Hillman's Academy room.

Closeup shows Cadet Hillman under colors of his proud Academy Honor Squadron.



Air Officer Commanding the Squadron, Maj. Earle H. Ambrose, talks with its five Cadet officers. Right, Hillman.

Superintendent, General Stone; Air Force Director of Information, Maj. Gen. Arno H. Luehman; Col. Richard E. Barton, commander of the nation's first operational ICBM squadron, the 576th Strategic Missile Squadron, Vandenberg AFB, Calif.; Maj. Robert M. White, chief Air Force test pilot on the X-15; NORAD's General Kuter; and Howard T. Markey, President of the Air Force Association.

At the banquet, each member of the Honor Squadron received a set of commemorative cuff links from AFA. Cadet Hillman, the Squadron Commander, was given a lifetime membership in AFA.

In a short talk, General Stone explained how the Honor Squadron is chosen to receive the AFA Trophy. Criteria for the selection embrace military drill proficiency, extracurricular activities, physical aptitude, intercollegiate and intramural competition, and the Academy's own General Order of Merit awards.

In the area of the military, all Cadet Squadrons were graded throughout the year on regular drills and performance in parades, when marching to meals, and at periodic drill competitions.

In athletics, each Squadron was graded for the number of its members participating in intramural and intercollegiate sports. For a Squadron member to contribute points toward the AFA Trophy in the latter category, he had to gain either a letter or fourth-class (freshman) numerals in some intercollegiate sport.

Additional weight in the standings was given for the number of students in a Squadron who attained the Superintendent's Merit List. To be on it, the Cadet had to have maintained an average of eighty percent or higher in all academic subjects if he were taking the heavier "enrichment" program, or eighty-one percent if he were carrying a standard program.

Figured in the computations, also, were Cadet conduct. A Cadet contributed toward the trophy if he was in the upper seventy-five percent in this area.

Points were also given for the number of members of each Squadron who held officers' positions in Academy clubs and organizations. Another factor in the weighting of grades was the physical aptitude test given to each entering class, with scores averaged on a Squadron basis.

The last and the largest weighting was the Academy's own first-class General Order of Merit, awarded for over-all academic and military performance.

(Continued on page 61)

CLASS OF '60: OFF THEY GO

THE US Air Force Academy class of 1960 numbered 227 Cadets. It was graduated in the Academy's second annual commencement on Wednesday, June 8. Principal speaker at the commencement exercise was Secretary of the Air Force Dudley C. Sharp. Of the total graduating, 218 Cadets were commissioned second lieutenants in the Regular Air Force, six became US Marine Corps second lieutenants, and two took commissions in the US Navy. One was graduated but not commissioned because he could not now meet USAF physical requirements.

Cadets received bachelor of science degrees and the wings of Air Force navigators. The majority of graduates were scheduled to enter Air Force pilot training this summer. Fifteen were slated for duties as navigators in Air Force units. Ten entered training in missile technology. One entered advanced navigation training. Four of the graduates will go on to further study in astronautics at the Massachusetts Institute of Technology under the Air Force Institute of Technology program.

June Week, the leadup to graduation and commissioning, included two demonstrations by USAF's Thunderbirds jet aerobatic team; an Athletics Awards Banquet on Friday, June 3; the Superintendent's annual reception for graduating Cadets and their families on Monday, June 6; the granting of class rings to the members of the class of 1961 and the class's subsequent Ring Dance on Monday, June 6; and the presentation of navigator's wings to graduating Cadets on Tuesday, June 7. In addition to these there were a number of other ceremonies honored outstanding graduates.

The Graduation Ball for the class of 1960 was held in Arnold Hall Ballroom on Tuesday evening, June 7. It provided a glittering and touching sendoff for the Academy's second class. The next day was Graduation Day.—END

AN ACHIEVEMENT IN DEFENSE ELECTRONICS

AN/FSA-12--First to detect and process 3-D radar data automatically

The first equipment to successfully automate the processing of three-dimensional data direct from a working radar, the AN/FSA-12 (XW-1) has operated since 1958. This detector tracker has enabled General Electric to develop many improved radar techniques and equipment.

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GENERAL ELECTRIC

'THE CREAM OF THE CREAM'——CONTINUED

There are sixteen Squadrons at the Academy. Each includes first (senior), second (junior), third (sophomore), and fourth (freshman) classmen. There are some ninety-five Cadets in a Squadron, of which a dozen or more are First Classmen.

Competition for this year's trophy was keen, especially between the two top squadrons, the victorious 7th and the runner-up 3d. The latter was last year's winner of the trophy. This year, it won the John J. Melanaphy Trophy, named in honor of the late 1st Lt. John J. Melanaphy of Houston, Tex., former Air Training Officer at the Air Force Academy who was later killed in an aircraft accident in Ohio.

A third award, the Steinhardt Trophy for outstanding military performance, was won this year by the 12th Squadron. The Steinhardt Trophy is named for Laurence A. Steinhardt, the late US Ambassador to Canada.

Probably the proudest officer at the banquet was the 7th AOC, Major Ambrose, whose Southern drawl hardly masked his excitement and pleasure at the showing his boys had made. One of the few AOCs at the Academy who is not a graduate of either of the older service academies, the thirty-five-year-old Greenville, S. C., native is a veteran of World War II and Korea who graduated from Army Air Forces pilot training in 1945. A senior pilot now, he flew forty-two combat bomber missions over Korea, has served in Okinawa, Japan, and Puerto Rico. He is married, has three children, has been at the Academy a year.

Sponsoring unit in the Regular Air Force for 7th Squadron is SAC's 7th Bomb Wing at Carswell AFB, Fort Worth, Tex. Each Academy Squadron has a USAF sponsor. The 7th's sponsor keeps close tabs on its young "replacements" at the Academy and has presented the 7th its unit colors and unit history. Occasionally a contingent from Carswell visits the 7th at Colorado Springs, and trips are set up for the Cadets to Fort Worth to see how a B-52 outfit operates—good motivation for young men with their eyes on careers in the sky.

So far as motivation is concerned, the Cadets of the 7th Squadron appeared to share this basic outlook with most other Academy Cadets past and present: They want to be pilots. The advent of rocketry and missilry has not changed that. Of the graduating first classmen in the 7th Squadron, all but two are off to pilot training. The other two were chosen for other assignments.

Two typical Cadets in the class of '60 were the 7th's Gordon Savage and William Kornitzer.

After graduation and the donning of his second lieutenant's bars, Gordon Savage was married to a girl he met during Cadet days, Carol Larsen of Denver. The young couple had adequate time for a leisurely honeymoon. He was scheduled to report to Moore Air Base, Mission, Tex., on August 8 for pilot training. Like many of his classmates, Lieutenant Savage would also like to get into the space or astronaut business sooner or later.

He tells a visitor that the Academy forced him out of himself, made him work to become a leader. It appears to have been highly successful in this regard. If he didn't possess these traits when he entered the Academy, Cadet Savage at graduation was a model of confidence, maturity, and judgment.

Top, Air Force Association Trophy was center of attention at AFA party for Squadron June 2. AFA President Howard Markey, Cadet Hillman, Academy Superintendent General Stone, Cadet Phil Lane chat across it. Below, Cadet Hillman and others stand on afternoon of parade with AFA, two other trophies given annually at Academy graduation.

Lieutenant Kornitzer, like his colleague, can't wait to fly. For him, the future holds dreams of B-58 Hustlers and space exploration. A good student, he "bought" the Academy's "enrichment" program, carried an extra number of hours in his undergraduate academic load.

The "people" in the Honor Squadron made it what it was, he observes. They were first in most endeavors because they "expected to be tops." The Squadron, it was noted, won five team championships in intramural sports this year, more than one Squadron has ever won in a single year at the Academy.

In the final days of the Academy year, the 7th had almost given up hope of winning the AFA Honor Squadron Trophy. As one of its members said, "Third Squadron will have to get lost in the final parade—or some one in Three will have to break a leg—if we're going to win."

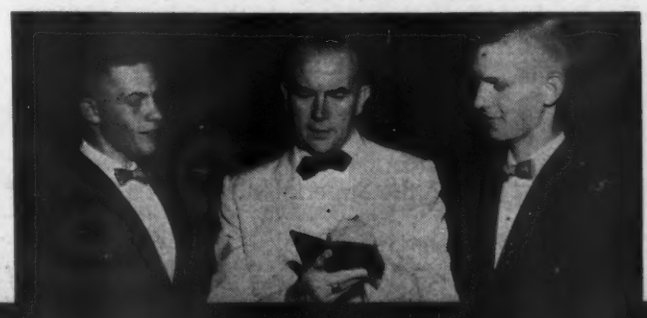
Afterward, another 7th Cadet said, "We are not outstanding on an individual basis, but we worked hard on a Squadron basis. We didn't have any real 'stars,' but we didn't have any 'duds' either."

The 7th produced more Academy military leaders than any other Squadron. It was represented in key command slots throughout the Cadet Group and Wing structure.

But not all the power in 7th Squadron came from its

(Continued on following page)

Milton Caniff, master of ceremonies at Squadron fete, draws a sketch for two 7th Squadron Cadets, Joe West and Fred Lindahl of class of 1963. Caniff is AFA member.



Lieutenant Hillman | Lieutenant Bilello | Lieutenant Boutz | Lieutenant Fischer | Lieutenant Jansen

Lieutenant Johnson | Lieutenant Kornitzer | Lieutenant Newcomb | Lieutenant Sands | Lieutenant Savage

Lieutenant Seebode | Lieutenant Sexton | William Siebecker | Lieutenant Yoakum

graduating class. Many points were garnered through underclassmen like Cadet Donald E. McCarter, class of '61, one of the most outstanding Cadets in the second class; Cadet Phil Lane, '61, who already has gained national recognition in football; and Cadet Leo Johnson, a halfback on the varsity football team, number one man in the class of '62, and Wing boxing champ at his weight.

A list of those members of the Honor Squadron who were graduated on June 8 follows (all assignments were to flying school with the two exceptions noted):

Lt. Richard J. Hillman, 21, Squadron Commander of the 7th, son of Mr. and Mrs. David S. Hillman, Rancho Santa Fe, Calif. Hillman was on the Superintendent's Merit List during the last semester of his freshman year and during his junior and senior years as well.

Lt. James A. Bilello, 24, son of Mr. and Mrs. Anthony J. Bilello, Edwardsville, Ill., former Squadron Commander. Before entering the Air Force Academy, Bilello had attended Washington University. He lettered three years on the track and cross-country teams and was captain of the track team the last two years. He was on the Superintendent's Merit List once.

Lt. John F. Boutz, 21, son of Col. (retired) and Mrs. W. R. Boutz, Albuquerque, N. M., a Cadet Flight Commander.

Lt. Robert H. Fischer, 22, son of Mr. and Mrs. Henry Fischer, Castle Valley, Pa., who during his Academy career held the position of Cadet Wing Operations Officer. Fischer attended Lehigh University before winning his appointment. A member of the Yearbook staff, he had been on the Superintendent's Merit List for two semesters and was a member of the track team.

Lt. John R. Jansen, 21, son of Mr. and Mrs. Alfred J. Jansen, Aurora, Colo., who had been Cadet Squadron Operations Officer. He was a member of the Honor Board, and was on the Superintendent's Merit List the first semester of his senior year. Lieutenant Jansen also won the Floyd Bennett award for the "most improvement in the General Order of Merit."

Lt. Daniel K. Johnson, 23, son of Mr. and Mrs. Herbert F. Johnson, Moorhead, Minn., also a Cadet Squadron Operations Officer. Johnson previously attended North Dakota State University. A football star (three letters) at the Academy, Johnson was picked to play in the annual Copper Bowl football game at Tempe, Ariz., in 1959.

Lt. William J. Kornitzer, Jr., 22, son of Mr. and Mrs. W. J. Kornitzer, Sr., Bennington, Vt., who at the Academy held the rank of Cadet lieutenant.

Lt. Sidney H. Newcomb, 22, son of Mr. and Mrs. Sidney G. Newcomb, San José, Costa Rica, a former Cadet Squadron Commander and Group Operations Officer. Newcomb was on the Superintendent's Merit List during his third- and second-class years, and was on the varsity soccer team for two years.

Lt. Charles D. Sands, II, son of Mr. and Mrs. C. D. Sands, of Hobbs, N. M., who is being assigned to a Strategic Air Command unit to receive further schooling at a missile technical school run in conjunction with civilian industry.

Lt. Gordon S. Savage, 21, son of Mr. and Mrs. Gordon S. Savage, Smyrna, Del., Cadet Flight Commander and Squadron Adjutant who rated high academically throughout his Academy career.

Lt. Thomas F. Seebode, 22, son of Mr. and Mrs. Vernon Seebode, Memphis, Tenn., who attended Memphis State University before entering the Academy.

Lt. Richard R. Sexton, 24, son of Mr. and Mrs. Frank R. Sexton, of Redlands, Calif., who attended Loyola College in Los Angeles before his Academy appointment. Sexton, a Cadet Flight Commander, was on the Superintendent's Merit List for the first semester of his senior year.

William D. Siebecker, 22, son of Mr. and Mrs. W. L. Siebecker, Wausau, Wis., Cadet first lieutenant and legal officer. Siebecker made an Academy letter in fencing. Graduated though not commissioned because he no longer met physical requirements, Mr. Siebecker will enter the Business School at Stanford University.

Lt. Victor E. Yoakum, 22, son of Mr. and Mrs. Vern M. Yoakum, Olympia, Wash., formerly Wing boxing champ for his weight class, and a Cadet Flight Commander.

General Stone, nearing the end of his first year as Academy Superintendent, is proud of the Honor Squadron. He is also proud of the Academy's success in meeting its prime mission: training the best Air Force officers in the world.—End

As writer and flyer, Ed Mack Miller has followed the aerospace story since the early days of World War II. Readers will recall his word-portraits of Vandenberg AFB and the Air Force Academy on these pages. A resident of Denver, Colo., and a neighbor of the new West Point of the Air, Ed is the father of eight youngsters.

The Convair F-106 sets record as world's fastest jet aircraft...

powered by a Pratt & Whitney Aircraft J-75 jet engine

At Edwards Air Force Base on December 1, 1959, the F-106 all-weather interceptor roared to a new world speed record of 1,525.95 miles per hour. Flying a straightaway course at an altitude of 40,000 feet, it bettered the previous official world mark by 122 miles per hour.

On March 1 this year, the Air Force F-106 also demonstrated that it has low-level striking power. At elevations of 50 to 300 feet, under most adverse conditions, the F-106 averaged 700 miles an hour in a 300-mile flight from Edwards Air Force Base.

Pratt & Whitney Aircraft's J-75 jet engine powers the F-106. With this same engine, Republic's F-105D fighter-bomber recently set a new speed record for closed-course flight. Over the years, Pratt & Whitney Aircraft J-57 and J-75 jet engines have held virtually every major flight record.

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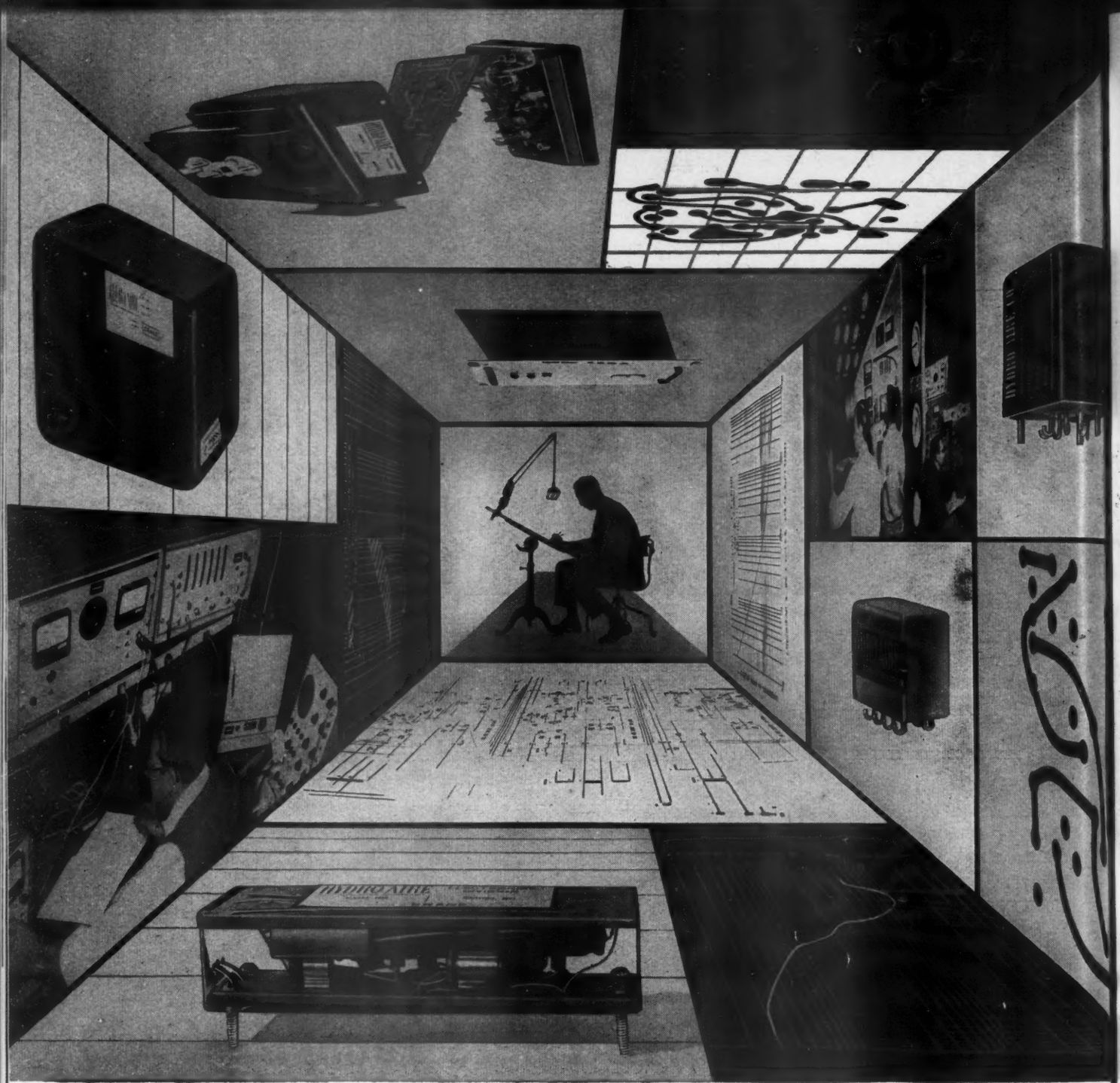

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THE SPACE AGE IN PERSPECTIVE

SPACE DIGEST

VOLUME 3, NUMBER 7 • JULY 1960

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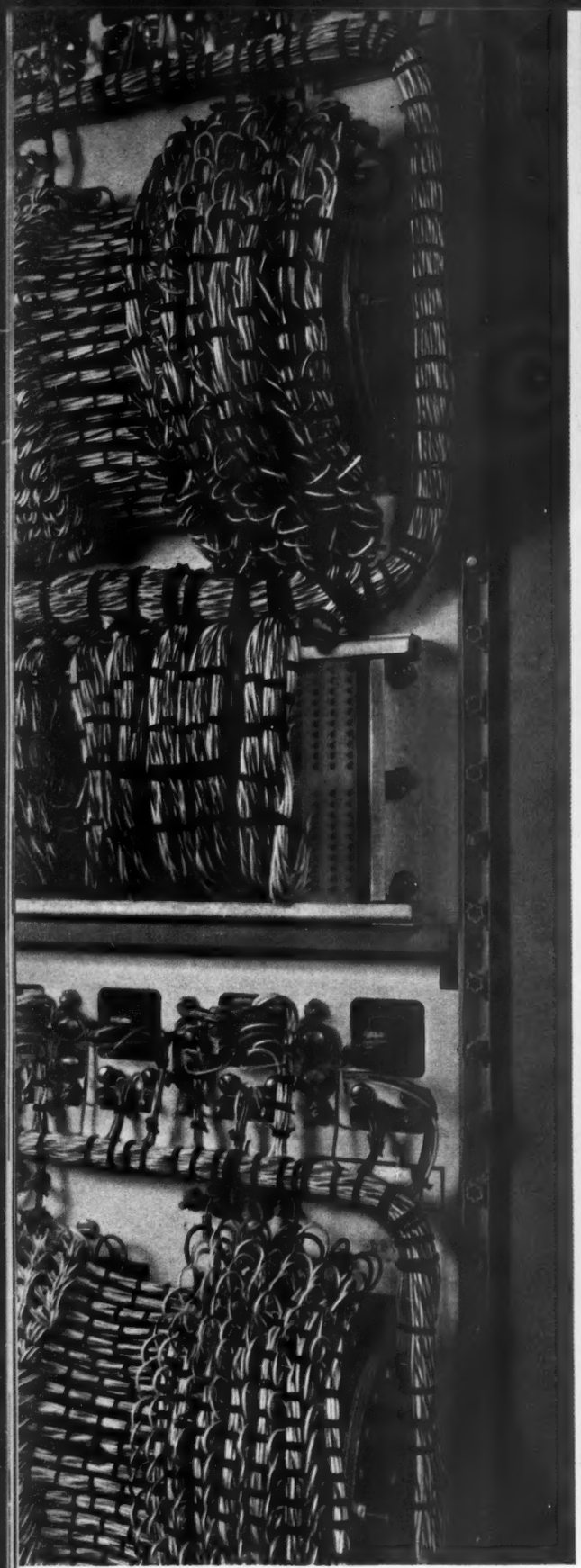
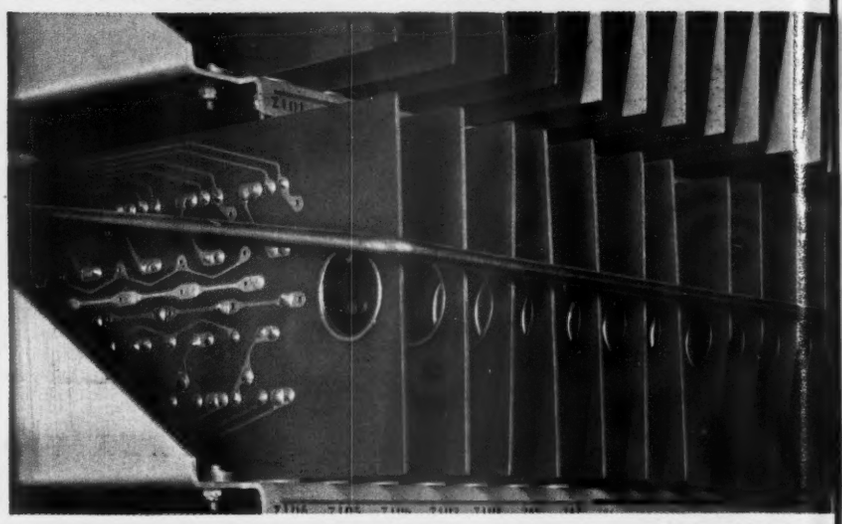




On guard against air attack—The Martin Missile Master electronic air defense system will protect ten major metropolitan areas by year's end. First installations have been delivered ahead of schedule and are now operational. According to the Army, Missile Master "will provide the most efficient and economical control and distribution of firepower available for the defense of strategic areas in the continental United States."

At 00h 00m 01s GMT, July 1, 1960, Martin logged its 590,304,000th mile of space flight

MARTIN

The space age is a revolution in the broadest sense of the word, and the consequences of revolution are never small. Here are some thoughts on . . .

GETTING OUR MONEY'S WORTH OUT OF SPACE

PAUL W. CHERINGTON

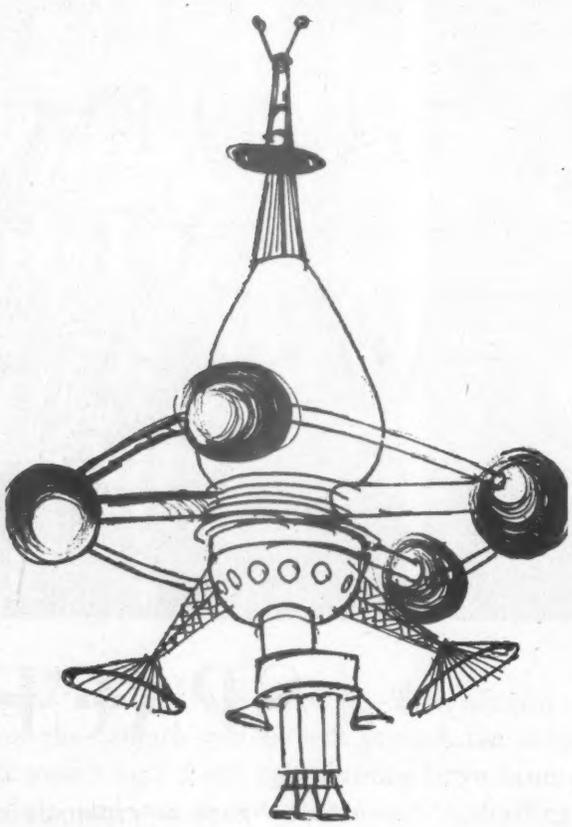
WHETHER the promises that space may hold are in fact fulfilled or not, the national effort which we will make in getting into the space age will be enough to change many of our basic economic institutions. Even though we find no life or no new materials on the moon or beyond and even though it should prove impractical or useless to have manned moon stations and manned satellites, the impact of the space program will dwarf almost all previous peacetime technical efforts. The space age is a revolution in the broadest sense of the word, and the consequences of revolution are never small.

All of this depends, of course, on whether we as a nation decide to pursue vigorously the present

space program or an expanded one. We have never before mounted a comparable effort in peacetime that was not intimately related to national security. If the idea that space is unrelated to military security gains acceptance, or if tensions with the USSR lessen, will we be willing, and will our political representatives be willing, to see an increasing amount of resources directed to pioneering space? Unless the government can show us the relevancy of the conquest of space to our everyday lives and those of future generations, or unless we ourselves have the imagination to see it, the answer seems to me clear: The program will not be supported, except as a military-oriented effort or as one aimed to beat the Russians.

Assuming . . . that we do move ahead on a vigorous space program, what are likely to be the economic consequences of the space age and when? To look at these questions, we must project not only the space program itself but also the underlying institutional phenomena—the central role of government, the rise of "exponentialism" [vast jumps in system and output capability in a short time], and the growing importance of systems engineering.

It will be convenient for purposes of this discussion to divide it into two time periods—the next fifteen years and the period beyond. It is also necessary to make the assumption that we will have a large continuing weapons program parallel to the space program.



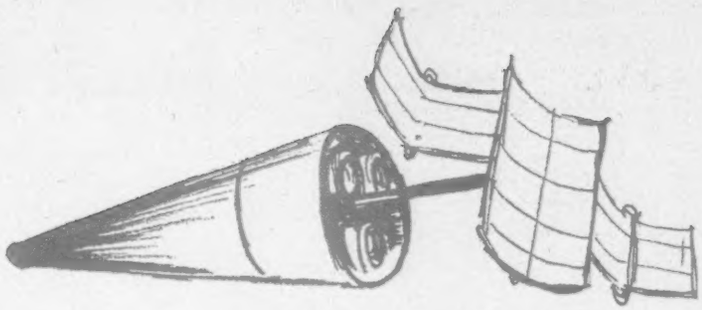
Under these circumstances, it is clear that over the next fifteen years there will be a continued demand for highly competent scientific, technical engineering talent. This will always be at a premium and the government agency or private institution that has it will indeed be fortunate. I include here really topnotch systems engineering talent which is in particularly short supply.

But while the demand for this type of talent will be increasing, the demand for production and production talent will be diminishing. We are not going to build the space probes or satellites by the thousands or even the hundreds. They will be built in ones, twos, or perhaps a dozen. Thus the extensive production facilities which we have in, say, the aircraft business will have lots of excess capacity and lots of excess workers. This trend has already begun and will grow worse over the next few years. It will reflect the transition of this industry from a production industry into a research and development industry.

The competition of these companies for large R&D programs and for the remaining production contracts will become more and more intense. In consequence, some of these companies will disappear; others will diversify into related or new areas and some will simply get much smaller. In ten years, there will probably be no more than two or three companies in this country which can make high-performance aircraft. The British have already gone through this process by having the government dictate a series of mergers.

The other industry which is heavily involved in the hardware for the space age is the electronics industry. Many of these companies are in both government and commercial work; they will enjoy a growing demand for production as well as R&D; and in any case, they have little excess plant and personnel. Nevertheless, competition in the electronics field, both among electronics companies and from the old-line aircraft companies which are developing an extensive electronics capability of their own, is bound to increase. This industry has been characterized both by large companies and by a host of small companies. Some of the small companies are apt to find the going increasingly difficult.

The growing importance of what are essentially R&D-type products plus increased competition, when linked with the institutional factors of a larger central role for government, exponentialism,



and increasing systems complexity, will almost certainly lead to a much higher degree of concentration in the space industries, at least so far as prime contracts are concerned. The small company will continue to play a role, but increasingly it is apt to be as a subcontractor. This trend may make the politicians unhappy, but both the technology and the heavy risk involved strongly suggest that this will be the trend. . . .

The growing concentration among space industry members will inevitably lead to some increase in the concentration of firms which make commercial products derived from the space sciences. . . . The first space-derived commercial products are likely to come in the fields of communications, meteorological instruments, and perhaps in various adaptations of computers. With a head start in the technology derived from government projects, the large prime space contractor is likely to have an advantage in translating space developments into salable commercial hardware. The enormous resources necessary to translate an R&D satellite, for example, into a useful commercial, worldwide communications system based on satellites could only be provided by a large company. In the computer field, this trend has already begun. A few large companies are beginning to challenge IBM in this field. The small companies that build and sell computers for commercial use are finding that the race is beyond their means.

As more and more new commercial products are made possible by our space explorations, there will be pressure for prompt introduction. The slow, step-by-step development of new products which has characterized industry in the first half of the twentieth century is destined to be materially speeded up. Because of exponentialism, the economic advantages of the new products will be too great to ignore, the competition too keen, and the penalties for failing to move ahead too great. It will be a risky and exciting business, playable only by the competent, well heeled, and patient.

I would not venture to predict in specific terms what these products will be beyond the areas which I have already mentioned. But by 1975 or 1980, it is perhaps not going too far to guess that a considerable sum in terms of annual national expenditures will be spent on products and services that trace their origin to the space age or which have been affected by the space program, using those terms in broad context.

Beyond 1975, the type of product that we can expect and the nature of the impact of the space age on our economic institutions is harder to predict. Far in the future is the possibility of more or less normal space travel, of trips to the moon, and all the other things we read about. There is no doubt that in the next fifty years the role of government in this whole field will be preeminent. The government will be the major market for new, advanced technology.

Nor is there any doubt that the role of science and advanced engineering will be enormously increased. The technical advances which will be possible will be dramatic and will come with a rapidity which will tax our ability to absorb them. The characteristics of the space age will be rapid change, enormous advances, and infinite distance. To capture even a part of the potential of the space age we must have the imagination and flexibility to adapt rapidly. We must have it in our citizens and in our economic institutions and organizations.—END

A distinguished authority on transport economics, Paul W. Cherington has since 1950 been a member of the faculty of the Harvard Business School. The above is condensed from his May 7, 1960, presentation to a space-age symposium at the University of Minnesota cosponsored by AFA, the Civil Air Patrol, and the University.

Air Force space projects such as the highly successful Discoverer program are creating a new breed of skilled personnel, the men who launch the vehicles into the void. Here is a profile of USAF Capt. Rob Roy . . .

DISCOVERER'S MAN IN THE BLOCKHOUSE

LOIS PHILMUS

VANDENBERG AFB, CALIF.

THE blockhouse was committed: "Stand by for launch! On my mark it will be T-minus-five seconds."

The Discoverer vehicle seemed to breathe softly. White wisps of oxidizer vented from its sleek sides. All eyes were on the closed-circuit television screen.

At T-time, the slender, seventy-eight-foot, gleaming-white missile roared alive. The full power of its more than 150,000 pounds of thrust was unleashed.

For a long moment, the bird hovered motionless over its pad. Then, as if taking a full, deep gulp of its awesome power, it broke its bond with earth and escaped into the deep blue of a cloudless California sky. A bright orange tongue of flame that became finally a long white contrail marked its wake.

Attention turned from the monitor television screen and focused on a young Air Force officer in a blue, skunk-striped helmet. He was seated at a large control panel awaiting reports on the launch.

Tracking reported visual sightings. Telemetry said it was getting early signals. Finally, radar at Point Mugu came on. All was well.

With a wide grin, Capt. Rob Roy spoke into a microphone:

"First-stage booster delivered full thrust and reached altitude. Second stage separated and ignited." He added, "Prettiest countdown we ever had. Isn't it a beautiful day?"

A cheer went up. Tension snapped. The countdown, third of the week, had begun at 4:30 a.m. It had taken more than eight hours.

The launch officer now turned and spoke with a visitor.

"It doesn't matter whether it's the first launch of a program or the seventh or seventeenth," he

USAF Capt. Rob Roy, symbolic of the new breed of USAF aerospace men, in a rare moment out of the blockhouse, against backdrop of a Discoverer vehicle. Captain Roy probably holds the free-world record for placing space vehicles into orbit.

Precountdown conference. Captain Roy goes over the "script," checking Maj. Pat Mulcaire's communications input plans. Pipe-smoking Lt. Col. Bill Heisler, Roy's chief, sits in at the meeting.

Just two hours to go before a Discoverer launch and a million things to check. Captain Roy carefully watches closed-circuit TV for signs of heavy vapors from oxidizer as the fuel is pumped into the booster. Fume inhalations could be fatal.

said, "it's always tense. We never get used to it. Actually, it gets progressively worse.

"It starts building as we get closer and closer to zero. The vehicle, after days of preparation where we can control every action, becomes an entity unto itself. It has no one to go along to make corrections. You can bring an airplane back from a test but not a space vehicle. We want to do a good job. We want all the systems working. We worry. We worry about safety, about technical readiness, about the outcome."

Rob Roy has a lot of worrying to do. He has done it for a long time. He will do a lot more in the months and years to come.

At the age of thirty-two, he is the Air Force's test operations officer for Project Discoverer. His command is a blockhouse and Vandenberg's two Discoverer launch pads. He is in charge of preparing the Thor-Agena vehicle from the time the components arrive at the pad until the firing key is turned. He conducts Discoverer's two-day countdown. He helped write the 100-page USAF "cookbook" that spells out every step in a space vehicle launch.

Rob Roy has launched a greater number of missiles in peacetime than has any other individual in the free world. When he "turned the key" on Discoverer VII, Rob Roy fired his seventy-fifth missile.

After Discoverer VII, he held the unpublicized record of successfully placing more earth satellites in orbit than anyone else—six successes in eight tries. The total keeps growing. At this writing, seven Discoverers have successfully been placed in orbit. (*See table at right*).

The most junior officer in the Air Force's space corps—the Ballistic Missile Division—Rob Roy is the Air Force's most experienced launch controller and is showing the way to his successors—some of whom will launch actual spacecraft.

Rob Roy joined AFBMD a year after his graduation from the US Naval Academy. With an electronic engineering degree under his arm, he chose an Air Force commission and became the first officer trained from the start for space duties.

USAF sent him to electronics school and guided-missile school. His initial duty station, in 1952, was Patrick Air Force Base, Fla. There he was launch officer for the Air Force's first development missile, the tactical-range Matador pilotless bomber, long before the nation's first launch pad was built and years before Sputnik I.

"We wanted to prove that we could fire the Matador on a short alert time," Roy recalls of that period. "We told the project people that we would check out the missile and wait in the blockhouse. They were to sound the alert when we least expected it. They took us at our word."

He and the crew waited. Twelve hours passed. No alert came. They took turns sleeping and standing watch. Thirty-six hours passed.

"We figured that either they were really putting our plan to the test, or perhaps they'd forgotten about the whole thing."

Forty-eight hours after he and his crew entered the blockhouse the alert came. The Matador was on its way to target two minutes later, shaving close to thirty minutes from the previous quick-launch record.

In part, this outstanding performance was due to the fact that a single unit launch checkout

THE RECORD IN DISCOVERER LAUNCHES

In the Discoverer program there were eleven launches between February 1959 and April 1960. Of these, nine shots were successfully boosted by the Thor vehicle, and seven of the Agena second stages achieved orbit. No capsules were successfully reentered and recovered. Here are the highlights of the Discoverer launches.

NAME	*LAUNCH DATE*	*STATUS (June 6, 1960)*
Discoverer I	Feb. 28, 1959	Down Mar. 5, 1959
Discoverer II	Apr. 13, 1959	Down Apr. 26, 1959
Discoverer III	June 3, 1959	Failed to achieve orbit
Discoverer IV	June 25, 1959	Failed to achieve orbit
Discoverer V	Aug. 13, 1959	Down Sept. 28, 1959
Capsule from Discoverer V		Still in orbit
Discoverer VI	Aug. 19, 1959	Down Oct. 20, 1959
Discoverer VII	Nov. 7, 1959	Down Nov. 26, 1959
Discoverer VIII	Nov. 20, 1959	Down Mar. 8, 1960
Discoverer IX	Feb. 4, 1960	Failed to achieve orbit
Discoverer X	Feb. 19, 1960	Failed to achieve orbit
Discoverer XI	Apr. 15, 1960	Down Apr. 26, 1960

console was used for the first time. Rob Roy was one of its designers.

In the next three years, Rob Roy launched more than thirty Matadors.

By 1955, the ballistic missile program was well under way. The Matador development program was over.

Overnight, Patrick AFB and its adjacent Cape Canaveral complex became the site for the testing of new propulsion systems, missiles, and warheads. Launch pads were built under accelerated programming. Patrick swarmed with scientists, military, technicians—all there to learn. Rob Roy was assigned as launch controller for the Air Force-Lockheed X-17 reentry test vehicle project.

"Actually," he reminisces, "for a long time I was the only person on it. I was both the project officer and launch controller."

The X-17 program was to gather data for the biggest problem in the development of ballistic missiles and subsequent space vehicles: the reentry of the nose cone. New materials were required to keep the nose cone from burning up. Scientists and engineers had a theory for Thor and Atlas nose cones, but the theory had to be proved under actual reentry conditions.

The X-17 was a three-stage rocket designed to fire straight up on its first stage and reverse itself above the atmosphere with the two last stages firing on the way down.

Working in secret for a year and a half, the then-twenty-nine-year-old Roy conducted thirty-seven launches of this complex research vehicle. By July 1957 the scientists had the answers they needed, and the US had a breakthrough. The reentry problem was on its way to solution.

Although hampered by lack of funds, the Air Force had meanwhile started working with Lockheed on WS-117L—Project Sentry—a program leading to development of an artificial satellite for military reconnaissance. Rob Roy was one of the officers assigned to Sentry.

Then came October 4, 1957. The Russians launched the first Sputnik.

The US was in a race. The Defense Department decided to push space research and development to meet military requirements. The new Discoverer program, essentially a continuation of Project Sentry, was to play a key role.

The basic Discoverer objectives were development of a satellite vehicle for ultimate use by early-warning infrared and polar-orbiting reconnaissance satellite systems. Products of the project would be the vehicles for Midas and Samos.

A group of USAF's space corps, assigned to Discoverer, pulled up stakes in Florida and set up shop in the new Ballistic Missile Division office at California's Vandenberg AFB, under the command of Col. J. J. Cody, already a veteran missileman.

Key figures who traveled with Discoverer as it was broken out of the original Sentry program were Lt. Col. William R. Heisler, in charge of space programs; Lt. Col. Charles G. "Moose" Mathison, head of the Discoverer Tracking, Control and Recovery Force at Palo Alto; and Capt. Rob Roy, in charge of test operations. All arrived within a month of each other, in the fall of 1958.

The program was funded. The Defense Department initially announced that Project Discoverer would include twelve launches the first year.

The Vandenberg space force dug in in September and October. Rob Roy was assigned a crew of seventy-five—the top engineers and technicians of the space industry, representing companies developing and building the more than a dozen subsystems for Discoverer and, subsequently, Midas and Samos.

As launch controller, Rob Roy had to gain complete knowledge of the subsystems, the more than 100,000 components, and their interrelationship with each other, that added up to Discoverer.

"Rob has to know in intimate detail what is in the birds," a fellow officer in AFBMD says. "As the countdown starts, each console operator reports the readings in various operations. Rob assembles the pieces. He must conclude what combinations of readings are acceptable and which

Industry helps provide the complicated backup for the Discoverer program. As launch time nears, Captain Roy, left, talks things over with two civilian "pros," representatives of Douglas, Thor builders, and Lockheed, the prime contractor.

Waiting time. A battery of military and civilian launch personnel sweat it out, waiting for the verdict on whether a Discoverer vehicle has attained orbit. Most of them have (see table, page 72).

"Go" or "no-go"—launch slang for the final decision that has to be made if something seems to be wrong at the last minute. On Captain Roy's shoulders rest the important, expensive, yes—or "hold!"

are not under given circumstances. 'Go' or 'no-go' is his decision alone in the blockhouse. The only higher authorities are Colonel Cody or the weather."

Rob Roy learned all the secrets of his space vehicle in less than six months before that first big Discoverer launch. His colleagues say he "absorbs data like a sponge and assimilates it like an electronic brain."

"We worked a long hard road to get that first one up," Rob Roy recalls. The countdown procedure was started and scrubbed at various stages a total of forty-one times.

Roy and the crew were plagued by technical problems, minor breakdowns, bad weather, and just plain newness. They labored months around the clock, seven days a week.

A Discoverer countdown actually begins at T-minus-two days with the checking systems and preliminary assembly leading to the actual countdown discipline scripted for T-minus-425 minutes.

The forty-second Discoverer I countdown began on the morning of February 28, 1959—a Saturday. It dragged on. Rob Roy held for fixes, uncertainties, but slowly everything checked out. Early difficulties with telemetry at the tracking stations cleared up.

Rob Roy gave the "clear-the-area" warning to Range Safety at T-minus-sixty-three minutes, one hour and three minutes before the earliest possible launch. He cleared the pad of all personnel just after they completed the hazardous manual fueling of the orbital stage—handling highly volatile fuels and a dangerous acid oxidizer.

He checked his network. His control center is a huge switchboard with three rows of buttons. Thirty inputs feed in from twelve countdown nets, the launch pad, tracking stations, Palo Alto, control, range safety, instrumentation, the weather people, the command post, camera stations, telemetry.

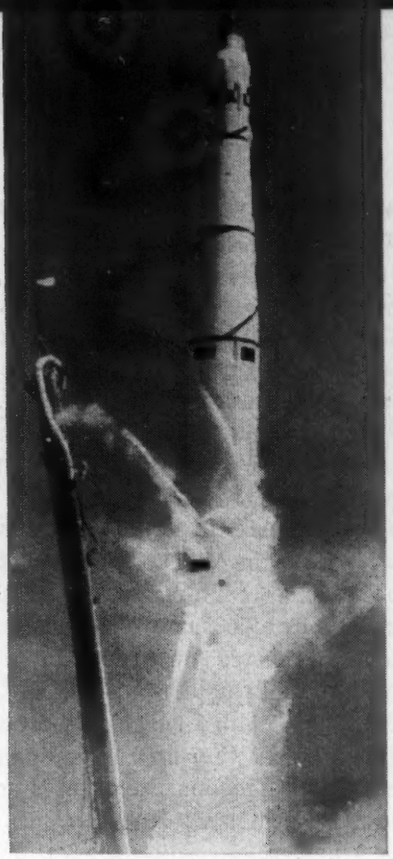
That morning, at the forty-second countdown, all signaled "ready." Rob Roy sealed the blockhouse and posted the guard.

At T-minus-11:30—eleven and one-half minutes to launch—he turned the firing key, and the last and critical countdown began—the terminal count: Phase I, electronic check and hold. Phase II, hydraulic check and hold. Phase III, rapid propellant loading of the modified Thor first stage. Phase IV, fine propellant loading. The last ten percent of the lox is added to the first stage, and here a deviation of one-tenth of one percent can make the difference between an orbit and a dud.

Then Rob Roy committed Discoverer I to launch. It lifted from the pad, was visible on the closed-circuit television screen for just a few seconds.

He waited for report of the ignition of the second stage. His network was buzzing. He was the hub. Telemetry seemed to be out. There was no signal. But radar at Point Mugu did command the ignition of the second stage.

His job was over for that day, but the waiting had just begun. He left the blockhouse after the second stage had been ignited and headed for the AFBMD field office for his first "orbit" vigil. It was a half hour after launch. It was a vigil he



The payoff. One of the successful Discoverers, Discoverer VI, blasts off into orbit from Vandenberg AFB, Calif., launch pad in August 1959. Discoverer data is leading to capabilities for projected Midas and Samos eye-in-sky vehicles.

would keep at each Discoverer launch. The orbit is the payoff.

Colonel Cody already had the line open to Captain Fix at the central tracking station. Reports would reach there from Alaska, Hawaii, and tracking ships. Within forty minutes, the fate of the Discoverer I launch would be known.

Restlessly, Colonel Heisler and the others conducted a post-mortem. Inevitably, an assortment of rumors circulated. Only one thing was certain. Telemetry was out. There were no signals yet.

As the time passed, all efforts at conversation were given up. Colonel Cody shifted the telephone from his left to his right shoulder and propped it under his ear. He looked at his watch—about ten minutes until the first station should have something. The only sounds came from the frequent clicking of cigarette lighters and the occasional scrape of a chair.

Forcing a smile, the colonel stretched and deliberately broke the loud silence:

"Somehow two packs of cigarettes have disappeared today. Who's got them?"

A major tossed a pack on Colonel Cody's desk, with, "Something making you nervous, Colonel?"

This broke the tension somewhat. The men joked a bit, made a few remarks.

Not yet attained but still hoped for is successful midair recovery of a Discoverer capsule. Here Fairchild C-119 Flying Boxcar practices snaring of package simulating an incoming Discoverer.

But Rob Roy neither moved nor looked up. His helmet was pulled low over his eyes. Still in his zippered jacket, he had thrust one leg over the arm of the wooden chair. He sat there going over every detail of the countdown in his mind. A cigarette dangled from his left hand.

Looking at his watch again, the colonel spoke to everyone but his eyes were on the blue helmet:

"It'll just be a few minutes now."

Rob Roy raised his head and pushed the helmet back. His eyes riveted on the phone receiver.

Minutes ticked by, then Colonel Cody straightened, gripping the instrument:

"Yes, yes, we're still holding. . . . ! We're waiting, yes. What do you think we're doing?"

A moment later, looking at the floor, he answered, "No signal, I see. One of the ships got a faint signal. Radio definitely out."

As if in slow motion, he raised his eyes and looked across at Rob Roy, "Uhhuh . . . and thank you." He hung up and a slow smile lit his face: "Radio's out, but radar's got it. Looks like we're in orbit."

He unwound his frame from its rigid position behind the desk and moved swiftly in front of the still immobile Rob Roy—who started uncomprehendingly at the outstretched hand offered:

"Congratulations, boy." Rob Roy grabbed the colonel's hand and simultaneously flung his helmet upward, letting out a long rebel yell.

Pandemonium! Rob was pummeled from the back, his hand pumped again and again. Everyone was congratulating everyone else. The blue and white helmet was tossed around the room

like a basketball, jammed on Rob Roy's head, then put into play again.

Actually, the orbit was not definitely confirmed until that night. It was such that Discoverer I would be short-lived. The satellite fell on March 5, just five days after launch. So, to many, it seemed like a very moderate success. But, to the USAF space team, it had succeeded very well indeed.

The scoreboard: Countdown and liftoff for the vehicle, successful. Separation of second-stage booster, succesful. Second-stage ignition and command computing, successful. Orbital velocity, successful. Only in communications, tracking, and data-acquisition had Discoverer I been disappointing.

They had plenty of reason to celebrate. Rob Roy's memory of that juncture is laconic: "I was quite happy."

Today, almost a year and half later, Project Discoverer is still going strong. So is Rob Roy. Most of the launches since have gone well. A few have not. In all, Discoverer has yielded an immense quantity of data and experience.

Here and there technical bugs have cropped up and been ironed out in due course. Midway through the program, new fuel was introduced for the booster. On one shot, four black mice went along as passengers.

In one connection, Project Discoverer has been frustrating. Again and again, the Air Force has attempted recovery of data capsules released from orbiting Discoverers. The purpose is to learn to stage recoveries from orbiting satellites with an eye on the eventual necessity of bringing men back from orbit. But C-119 Flying Boxcars armed with recovery gear, and patrolling stations in the vicinity of Hawaii, have not had an opportunity to try at recovery, including the most recent Discoverer, at this writing, Discoverer XI of April 1960. None of the capsules was ever found, at least by us.

Ironically, with all his launch experience, Rob Roy has never seen a launch except on TV or film. But one evening last September he did see his first artificial satellite. It was Discoverer V. He, his wife, children, and some friends gathered to watch it pass overhead. He says of the experience:

"I suppose it's the fact that you can see something you've done, actually see it instead of talk to it by radio signal, that makes you feel really good. At such a moment, it's also kind of eerie as you realize that there it goes across the sky. Not too long ago you put your hands on it, you looked at it, you worked on it. We sweated that one out the way we've done all the others. . . . It's pretty hard to explain."

He describes his job more readily:

"We can't be subjected to pressure. The biggest thing that protects us is loyalty to the program and a feeling of pride. We can't be pressured into taking chances. We have to verify. We have certain rules to follow, like a baseball game. They want schedules. We will meet them with quality, not by gambling.

"We play it safe. If we think we have a problem, we want to investigate it. It's much better to take a day or a week than to lose the missile.

The work Rob does now—launch controlling—will soon be shared by others. Lt. Edward P. Schelonka is one of his understudies. He is attached to the 6594th Launch Squadron, now being organized as the first operational satellite squadron. Maj. Kingdon Davidson is another understudy. He will spell Rob Roy on later Discoverer launches.

Rob Roy is symbolic of the space launch corps of the future. Says Colonel Cody in this regard:

"He represents the first of what will be a highly selected group of launch controllers. We have no procedures to follow other than those we devise now. We're learning from each other as we go along. Rob has the knowledge, the complete discipline, the power for thinking through quickly every decision. He is the hub around which our program is built. He represents the new corps."

To meet this rather awesome responsibility, young Captain Roy works twelve to eighteen hours a day, six to seven days a week. He sees his family mostly when they are asleep.

He must carefully make decisions but often only has minutes and seconds in which to weigh them. He is under constant pressure and tension—but is calm, knowing one bad guess can cost millions of dollars and priceless time.

Each vehicle under his command costs $3 million, yet his compensation is the standard for his junior rank. And, he asserts with a grin that momentarily wipes out the fatigue lines from his face: "I've got the best job in the Air Force."—END

A former Pentagon reporter, Lois Philmus is now living in the Los Angeles area where her free-lance beat is the aerospace world of the West Coast. She specializes in rocketry, is a member of the Aviation and Space Writers' Association.

Aside from hardware problems, the space age will demand of us a new respect for precision, a real faith that the world does have a future, and a recognition that *women* as well as men must understand the new era. A noted anthropologist speaks out on . . .

THE NEWEST
BATTLE OF THE SEXES

MARGARET MEAD

IF WE are going to have an educated public that can support scientific research, the amount of funds that we need for the space age, and the kind of educational system that we need, a great deal is going to have to be done very rapidly to increase the average lay sophistication. It isn't going to be enough to have small children perfectly at home with relativity, because small children aren't in Congress.

The whole controversy over education gives us an opportunity to aim for this because our peculiar system of education involves so many people on both sides of so many issues that it's possible

to turn the education system into a forum where we can discuss almost everything. We can discuss arithmetic; we can consider the fact that eight years of arithmetic almost certainly ruins any mathematician for good, unless he can invent some very ingenious way of escaping. We can discuss our present attitude that mathematics is unfeminine, that if the best student in the mathematics class is a girl, she is told to study typing, while we walk around with the silly notion that we are going to have enough men scientifically trained to teach science in this country, although we obviously aren't.

No matter what amount of federal subsidy of education comes through, no matter how well we step up our school systems and honor our teachers, we are not going to get enough men science teachers. And if we continue to insist on having male science teachers, science is going to be taught by male physical-education instructors. Science in this country now is too frequently taught by male physical-education instructors and female home-economic teachers, neither of whom are interested in it or fitted for it. And we are going to have *more* physical-education instructors, because girls like boys to go into the field because it gives them a rapid career, allowing them to get married earlier than if they went into the sciences. Teen-age girls today are exceedingly important in the career choices of boys.

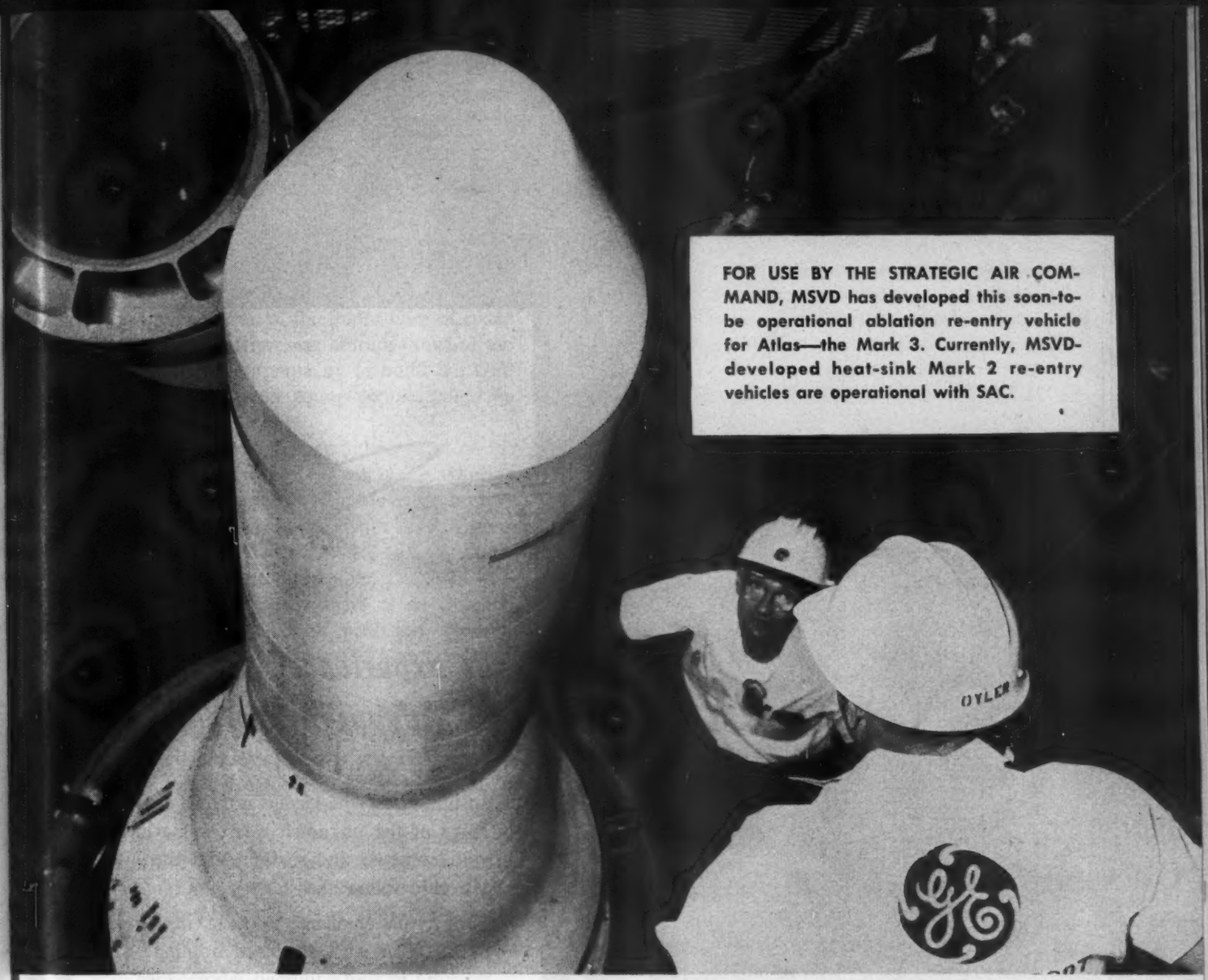
Our very peculiar present setup, where boys make their career choices when they are in high school, and are already going steady with girls who are determined to marry at once, means that the girls, of sixteen or so, have a crucial voice in the career choices of boys. Thousands of boys are being diverted from scientific careers and long-time careers of any sort, because when the boy says, "Oh, how I would like to be a geologist, or a physicist, or an architect," the girl says, "How long will it take?" That is the only thing that interests her.

The present split in knowledge and attitudes toward the future and toward space, between men and women, is very serious. Actually, we have a greater split in the knowledge of men and women today and in the attitudes of men and women than we have had since women started going to school. The general belief that women aren't interested in the hard sciences, that women shouldn't go into mathematics, has coalesced with the fact that women want men to stay at home. Women want men to stay at home now probably more than they have at any period in history. They need them more. They need them to look after the children and help build the house and do all sorts of things that they didn't used to need husbands for. They used to have other female relatives and neighbors to help or not so many children. But now, they need husbands at home, and there is a tremendous objection to men going anywhere. Part of the feeling about space, which spreads right through the country, is women's objection to men's going there.

We have done all these fancy things, such as having seven married Astronauts, with one whose wife volunteered for him. We think that's very pretty. But I don't think it is. I think it's like giving women diplomas when they push their husbands through college. We have insisted that the Astronauts be normal married men with children. We have not permitted them one single deviation in any known direction. The way they are *represented* in the magazines, you can hardly tell them apart. They were picked out by computers to specification, and the assembly of seven such perfect people in physical and physiological and reaction time and flexibility terms is, of course, a tremendous achievement that you could only do with a computer and a population of almost 200,000,000. At the same time, our emphasis has been on producing people who are just alike, and the Astronauts are all presented in this form, and they are not models for other women's husbands—not one little bit.

Part of this is, of course, due to the general state of research in the fields of space. Nobody is doing decent research in the social sciences in space at all. No one is really considering what the composition will utimately have to be of *groups* who will work together in space. They are picking individuals who are nicely anchored to a wife and children here on the assumption that that will make them want to come back. I think it shows a terrible ignorance of space engineering to believe that at this stage it's going to be up to them to a very great extent as to whether they get back or not.

We are not considering the human aspects either, in our attitude toward space or what space colonization and space travel will ultimately mean. Science-fiction writers are, but science-fiction writers take a very gloomy view of the human race, so that while they spread a wonderful picture of the possibilities of space, most of them spread tenth-rate genetics and twentieth-rate sociology and very dim ethics as they picture race wars in space and evolution going backwards in space and terrible rows of incestuous colonies on spaceships in space. The general picture of hu-



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manity being presented through science fiction is very poor. The research on the human element is very poor, and the division in our minds between hardware and technology on the one hand and human lives as they are lived here, is much too great. But, on the other hand, what space can do and what a recognition of the *importance* of space can do to change our present attitudes toward the future and our present capacity to build the kind of character we want in young people, could be enormous.

If you look the world over today, most of the advanced countries in the free world are suffering from apathy, boredom, togetherness, and other sorts of behavior with low survival value. A great many people in the free world are worried about the character of our young people. They are worried, for example, because there is so little respect today for any sort of precision. No one thinks under any circumstances it is necessary to get anything right.

Not only that, the average American thinks that if you blame him for getting anything wrong, you are mean and unkind, and not a good person at all. So, the taxi driver goes in the opposite direction for half a mile and when you point it out to him, he says, "Well, everybody makes mistakes." On the railways, you buy a ticket three weeks in advance, and you get on the train and then there is no berth, and they say, "Yes, well, things aren't what they used to be, are they?" Secretaries are incapable of transposing three figures from one sheet to another.

Just as we approach the period where we are going to have to use technology a great deal more, we find we are not able to build a decent respect for accuracy in our young people. And accuracy is terribly necessary in the air and in space!

The second defect, apathy, lack of ambition, conformity, all the different names that we call it today, which results in everybody wanting nothing but togetherness and a job that will guarantee togetherness, comes partly from a lack of belief in any future at all and partly from a lack of belief in a future that is exciting and worth living for. People are behaving today the way they behaved in the middle of the war. They are afraid that they are going to lose the chance to live. So they snatch and grab everything right now. They want to get out of school, they want to get degrees, they want to get a job, they want to get married, they want to have life—all of it right away. This is serious, because it means that we are going to be short of scientists, short of statesmen, short of planners of every sort. In order to have real creativity, you have to have a belief in the future, and a belief that the future is worth planning for, worth working for, and worth living for.

Now, fortunately for us, as Americans, the one thing that Americans like better than almost anything else, is a little empty space. We have been fascinated since the beginning of our nation by the size of our country, the emptiness of it, the way we could go out and cut down trees and put something else up. We have, in fact, destroyed a lot of the country in our enthusiasm for creating empty space and filling it up with something else.

I grew up with the notion that the frontier had shaped our characters and that there was no frontier any more. In 1920 we all knew that there was no frontier any more. What we had to have were frontiers in literature, scientific research, human welfare. This was a beautiful figure of speech. I used it for years, but the first time somebody really talked to me about space colonization and what it might be like to really put a colony out there that could do as it liked, I discovered that a little real new space in which you could put a new society was much more exciting than pushing back those figurative frontiers.

If we can catch the imagination of our young people with the possibilities that space offers, we then may have a sufficiently long time perspective for them to be willing to do the kind of studying that is going to be necessary for the kind of scientists and engineers that we need in space. Study is going to be necessary for the kind of poets who are going to write about space too, and the painters who are going to paint about it. Those people who have been advocating a science education at the expense of everything else want to remember that to date it's the poets and the painters and the dreamers who have created the climate of opinion that made it possible for the scientists to invent and build.

This is the first time in history in which we are having to tell boys that "your job in the world is never to kill anybody, if it can possibly be prevented"—in which we are genuinely phrasing all our military establishment as a deterrent. We are telling people that they are going to have to fly around for years and years with bombs they mustn't drop. We are having to tell young people in new countries that are terribly impressed with themselves, just full of oats and beans, who would like to go out and win a lot of glory and die for something immediately, that this is the most destructive thing that they can do.

Bravery is going to consist in living—year after year, with patience, with endless alertness

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PHYSICAL SCIENCES—Recognizing the need for a partnership between electronics and physical sciences, Melpar has established a materials research laboratory within its electronics complex. Research on the structure and application of new materials to support electronics is advancing at Melpar. Experienced research staffs are now evolving practicable, workable designs in such areas as high temperature effects on materials and molecular electronics.

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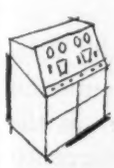
MELPAR EQUIPMENTS form an integral part of many advanced weapons systems, and equipment developed at Melpar will comprise a part of the first manned-satellite launched into orbital flight.

In these areas, opportunities exist for the professional growth of creative engineers. To advance yourself professionally, write to Melpar today.



DATA HANDLING—Melpar designs, develops, and produces fully automatic data handling systems with both tremendous data gathering capacity and the ability to process results in a relatively short time. New approach philosophies have been applied to the development of special purpose computers, tactical displays for weapons systems, and systems for both data reduction and data processing. Melpar has full data handling resources, with a broad range of customer services—from problem analysis to complete system design.

RECONNAISSANCE—Early design and development experience with reconnaissance systems led Melpar to recognition of the possibilities inherent in new reconnaissance techniques. Now, Melpar leads the industry in the development, design, and production of reconnaissance systems that incorporate new and sophisticated techniques. One example of Melpar's leadership in this area is the conception, design, and production of one of the largest airborne electronic systems ever developed.

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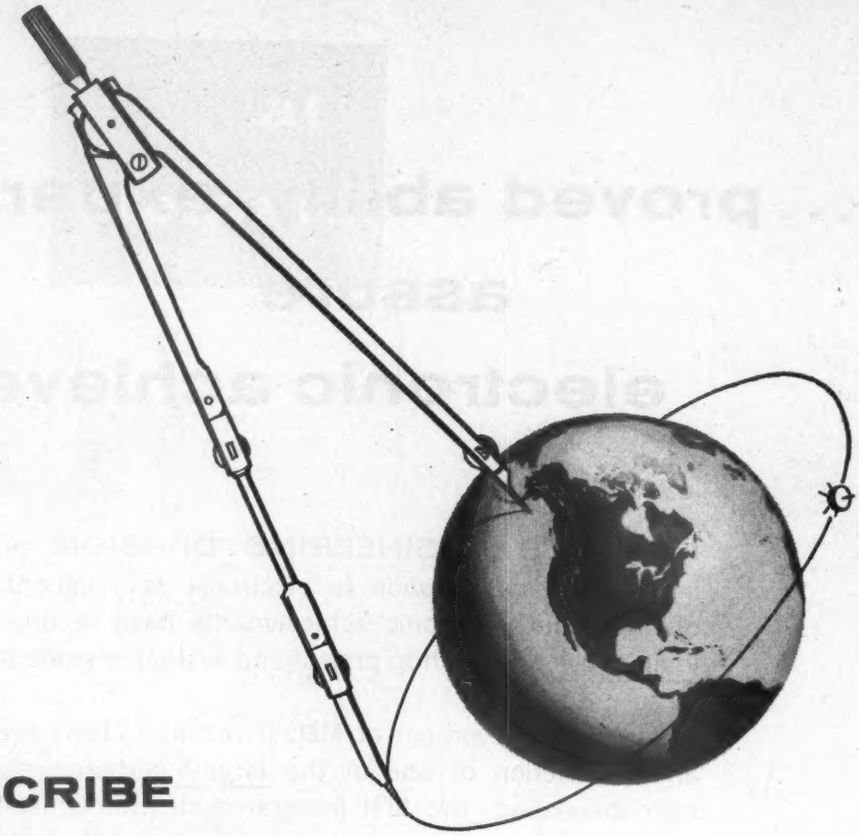


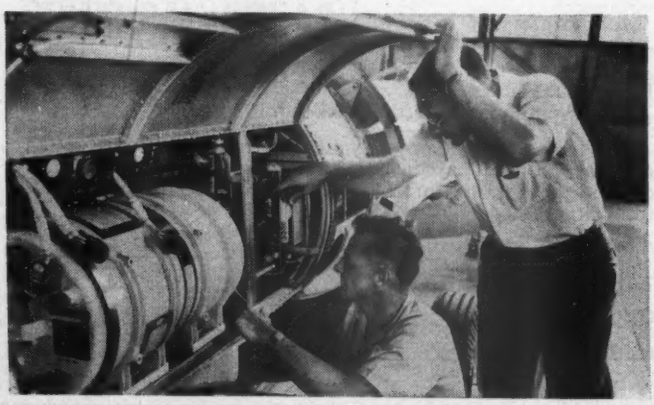
HOW TO SCRIBE A "PERFECT" CIRCLE IN OUTER SPACE

Bell Telephone Laboratories guidance system achieves unprecedented accuracy in steering Tiros weather satellite into orbit

Equipped with TV cameras, tape recorders, solar cells and antennas, the world's most advanced weather satellite, the NASA Tiros I, had to be placed in a precisely circular orbit at a specified altitude to do its job well.

The "shot" was a virtual bull's-eye. The mean altitude was within *one mile* of that planned. And the deviation from this mean was less than ½ per cent, making it the most-nearly-perfect circular orbit ever achieved with a space vehicle by either the United States or Russia.

Two Bell Laboratories engineers, T. J. Grieser and D. R. Hagner, look over the second-stage section of the Air Force Thor-Able missile used to launch the NASA Tiros weather satellite.



The dependability and accuracy of Bell Telephone Laboratories' ground-controlled Command Guidance System have been proved before—in the successful tests of the Air Force Titan intercontinental ballistic missile, and in last year's Air Force Thor-Able re-entry test shots from which the first nose-cone recoveries were made at ICBM distance. Now, with Tiros, the system contributes to a dramatic *non*-military project. Other uses are in the offing.

This achievement in precise guidance again illustrates the versatility of Bell Laboratories' research and development capabilities—directed primarily toward improving your Bell telephone service.

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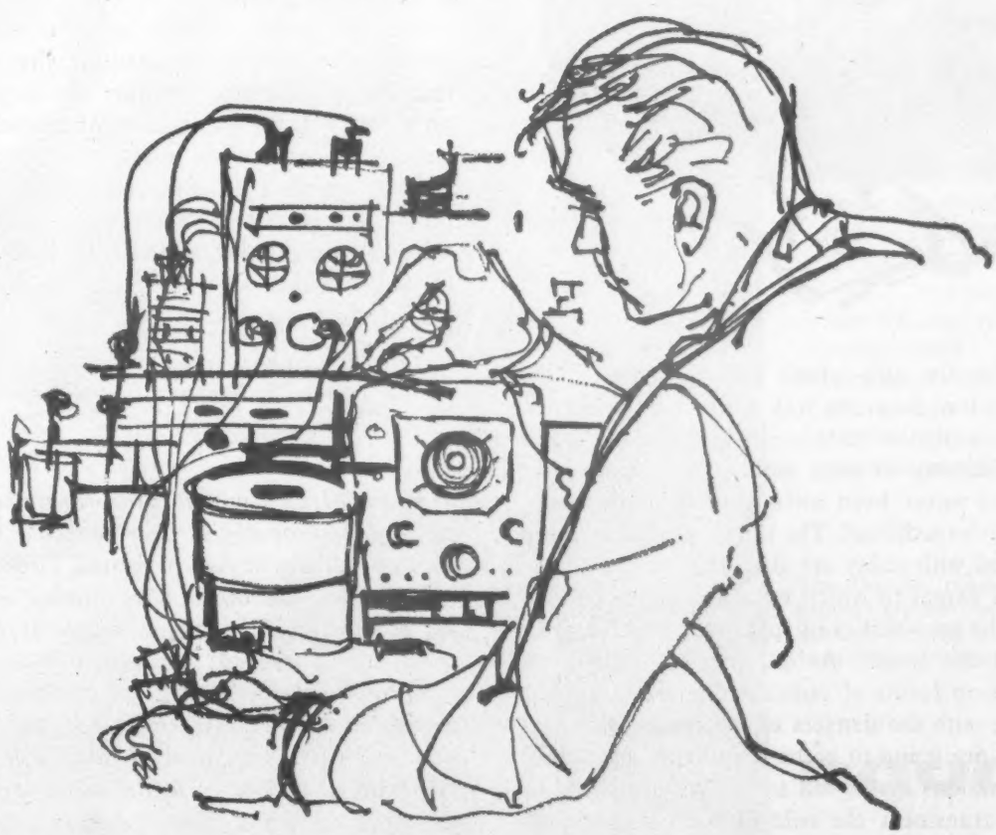
and endless attention, and no chance to drop the bomb, or let off the missile, or anything else. This is our phrasing of the present conflict. This asks a tremendous amount of men—it has never been asked of little boys before to look forward to such a future.

We are asking masses of our young people to go into the armed services where they will be trained in skills that the one thing they must not do is use. This the human race has never asked of males before. Can we only combine this request for endless patience, endless nonprovocativeness, and endless summit conferences, with a sense of outer space, that the next one hundred years is going to present the most exciting adventure that human beings have ever had? "You are going to have a chance to get into this, kids," we can say. "You are going to be asked to do things that will require more heroism than any human being has ever been asked to show before."

They are going to be asked to explore, and on explorations, we always send men alone—that is a fixed rule of exploration, because we want them to come back. No women! It isn't a question of coming back to their wives, it's a question of having no women on the exploration at all, so the men will come back. Later, for colonizing, women will be needed. But first astronautics is going to involve men exploring. Girls have got to be back of the idea, and girls won't like a lot of men vanishing into outer space and not coming back. Unless we can involve the girls in the issues that are important, we are going to have every girl in this country pushing against our scientific programs and against an understanding of space, because they don't want the country turned into a widow's walk as Portugal was in the days of Henry the Navigator, when thousands of men sailed away and didn't come back.

What we want today is, instead, the kind of



notion for the girls which involves them in the program, too. Now, the way to involve the women in it is going to be to emphasize some other things. Bravery in men women appreciate. But they have never been awfully enthusiastic about long-term expeditions. The things that women are concerned with today are the safety of their children, the extent to which we are going to be able to turn the possibilities of space into new forms of safety in this world, the question of whether we will develop forms of political organizations that can cope with the dangers of the space age.

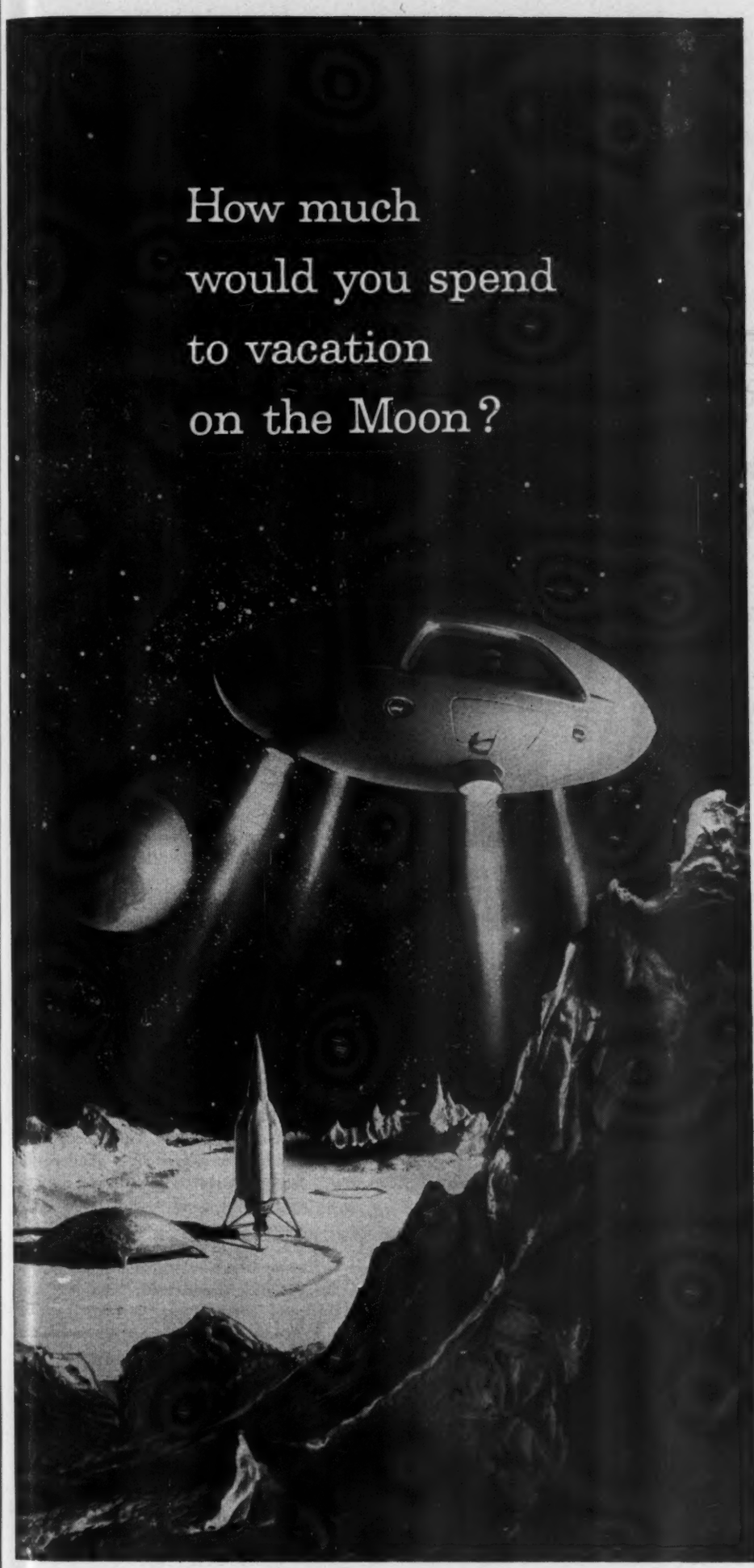
There are going to be no continents any more, and no nations in the old sense. We are going to have to transform the role of each nation into keeping all the other nations from blowing up the earth—this is going to be something that is meaningful to women as well as to men. Finally, the more we think about the strange beings we may encounter in space the more we recognize the unity of the human race and realize that we are one species.

Everybody in this country is voting for medical research. You remember there was a Gallup poll just a short time ago asking people where they thought the priorities lay, and space got a little miserable few percent and medical research got way up around ninety percent. Medical research means two things to Americans—it means prolonging their own lives, because they haven't enough faith in the future to think that other people's lives are going to be interesting later, and it means particularly to girls and women humanity and compassion and relationship to other human beings. We are going to have to build these two sets of ideas together into a program, so that space means greater well being for our children and adventure, an outlet for all the things we thought there wasn't any outlet for, and a belief that the frontier isn't closed, that there are endless possibilities and we don't need to be discouraged by the population explosion, and we don't need to feel that life is going to get duller and duller so it isn't worth living.

We can begin to solve some of our age-old problems of human organization, when we realize that this is just earth, with just one human species on it, and with such communications that you can get anywhere in a few hours.

Once we develop these new values it will be possible to reset our expectations and hopes, release the imagination and creativity of our young people, and preserve the human species on earth and in space.—END

Margaret Mead is probably the world's best-known cultural anthropologist. Her readable books, including Coming of Age in Samoa, Growing Up in New Guinea, *and others have attained wide popular readership. The above article is condensed from extemporaneous remarks at a recent space symposium at the University of Minnesota, cosponsored by the University, Air Force Association, and Civil Air Patrol. Readers will recall her "Bringing Up Children in the Space Age," which appeared in* SPACE DIGEST, *in February 1959.*



Out of today's space research come unexpected by-products —perhaps even space travel for the average citizen . . .

When only explorers dared cross darkest Africa, few foresaw it as a future vacationland. Outer Space now stands in a similar position.

What will Lunar vacations cost? When rocket development is written off and we have nuclear power, a traveler may go for about the present price of a tiger hunt or African safari!

At Douglas Aircraft, builder of the big DC-8 jets, practical steps to bring this about began 14 years ago when Douglas engineers designed and engineered a feasible space platform. Today, with more than 20,000 rockets under its belt—including the *Nike* series and *Thor*, reliable Space Age workhorse—Douglas is deep in a series of space age studies: the moon as a military base . . . compact space huts . . . how will man react to the space environment . . . what useable natural resources to expect . . . and, always, more efficient rockets for military, scientific, and peaceful needs.

The Douglas concept of a *complete* support system has resulted in space research ranging from nuclear rockets to nutrition for space travelers

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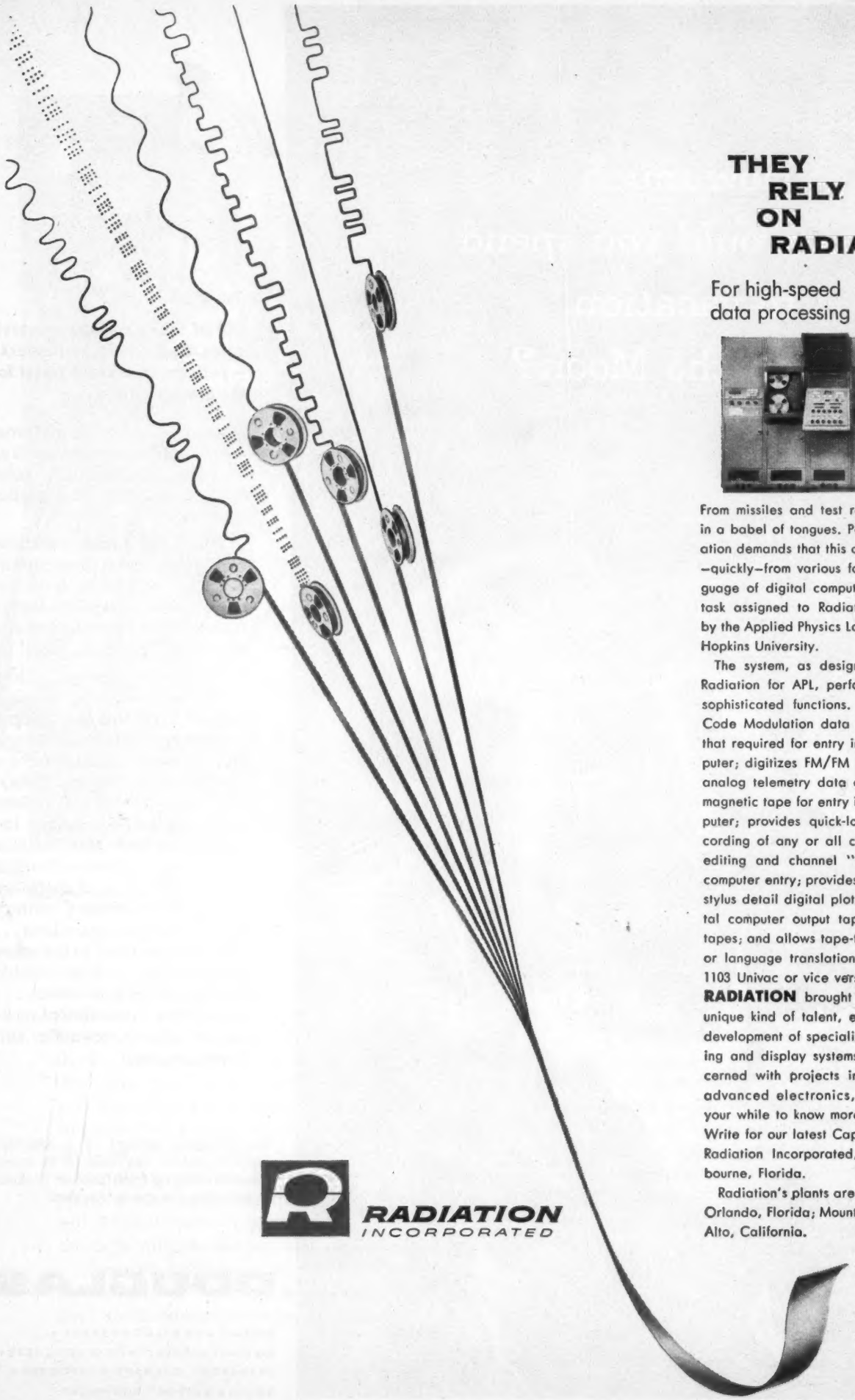
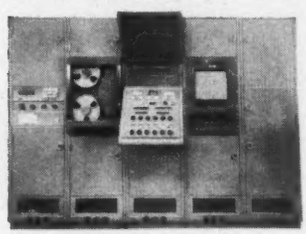


THEY RELY ON RADIATION

For high-speed data processing systems



From missiles and test ranges come data in a babel of tongues. Performance evaluation demands that this data be converted —quickly—from various formats to the language of digital computers. This was the task assigned to Radiation Incorporated by the Applied Physics Laboratory at Johns Hopkins University.

The system, as designed and built by Radiation for APL, performs a number of sophisticated functions. It converts Pulse Code Modulation data from raw form to that required for entry into a digital computer; digitizes FM/FM and PAM/FM/FM analog telemetry data and records it on magnetic tape for entry into a digital computer; provides quick-look multistylus recording of any or all channels for visual editing and channel "stripping" before computer entry; provides high-speed multistylus detail digital plots from either digital computer output tapes or the source tapes; and allows tape-to-tape conversion or language translation of IBM tapes to 1103 Univac or vice versa.

RADIATION brought to this project a unique kind of talent, experienced in the development of specialized data processing and display systems. If you are concerned with projects in similar fields of advanced electronics, it may be worth your while to know more about Radiation. Write for our latest Capabilities Report to Radiation Incorporated, Dept. A-7, Melbourne, Florida.

Radiation's plants are at Melbourne and Orlando, Florida; Mountain View and Palo Alto, California.

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If we want to project our free economy into the space age, we must plan now for private enterprise participation in astronautics. A leading industrialist takes a long look at . . .

FREE ENTERPRISE... *OUT OF THIS WORLD*

RALPH J. CORDINER

THE rapid progress of the Soviet Union in missile and space technology demonstrates how a controlled economy can ruthlessly concentrate major resources in a particular field of technology and achieve rapid results—while neglecting other fields and keeping the population at a low level of living. Some have taken this to mean that the United States, in order to move out ahead of the Soviet Union in space technology, must adopt something like the Soviet method of strict government control of that technology. In my opinion, such an imitative procedure is doomed to fail.

The United States has its own more effective way of concentrating efficient effort on a technical project of importance to the national security. And that is for the people, through government, to determine the objectives to be attained, and then to turn most of the technical work of achieving those objectives over to the private firms that have the managerial and technical capacity to get the work done—using competition and profit-or-loss incentives to the maximum. . . .

Therefore, it is my view that national economic and military progress will be faster and more solid, and the freedoms we cherish will be preserved, if competitive private enterprise does just as much of the nation's scientific and technical work as possible—and government provides the legal and policy framework to stimulate outstanding technical performance.

On the basis of these principles, let us now attempt to foresee the general outlines of the venture into space, and try to determine the specific roles of the government and private enterprise.

The exploration and use of space, like any other exploitation of a new frontier, will probably proceed in three main stages: the stage of *exploration;* the stage of *economic development;* and the stage of *mature economic operation.*

I do not mean that these will be entirely separate periods, or that after—say—forty years, exploration will end and economic development will begin. Rather, it will be an expanding picture.

First, the area of space near the earth will be explored until it becomes sufficiently familiar, and apparatus become sufficiently reliable, for such first industries as satellite communication to be established. We are well into this phase. . . .

Exploration does not stop but moves outward to the inner solar system, which includes the moon and the nearby planets, Mars, Venus, and Mercury. Economic development follows. . . .

Before long there may be three phases operating simultaneously. The major area of exploration by that time will probably be in the outer solar system, including the less dense planets—Jupiter, Saturn, Uranus, Neptune, and Pluto. Preliminary economic development may be starting in the area of the moon and the nearby planets. And space immediately around the earth—where most of the present satellites are in orbit—will be entering into mature, systematic economic operation with such commercial industries as long-distance communication on a large scale, private weather forecasting and modification, and terrestrial rocket transport.

Generally speaking, the exploratory stage is likely to be government directed, with substantial industry participation; the stage of economic development will be marked by government phasing out and commercial industry phasing in; and the stage of mature economic operation will —if private enterprise is to survive in the space industries—be primarily based on private ownership and operation under suitable government regulation, including some form of international law or agreements. . . .

The scale of this exploratory work, the cost of it, and the lack of any financial return for a long time, and the extra expense of hurrying because of international power politics, almost necessarily make the exploration of space primarily a government-sponsored and government-financed operation. It is useful to remember that the voyages of exploration in the fifteenth and sixteenth centuries, opening up the Americas and the Orient to European development, were also government sponsored. But the successful economic development was done in the follow-through period by private traders and colonists —at first with direct government support and sponsorship, and later with the governments serving only to maintain order and provide military and naval protection. On the space frontier, the scientific voyages of exploration will also be government sponsored and financed.

However, the management and operation of these exploratory operations should be done primarily through government contract by private firms, with competitive incentives for superior performance and penalties for failure. Private firms and private universities should design and produce most of the apparatus required to get there and do the exploratory work.

This approach will not only utilize the most experienced scientific and technical organizations in the country, but will also accomplish the objective faster and more economically, and will help prepare the companies for the day when commercial [space] businesses can be conducted.

Even in the exploratory phase, must we necessarily assume that all the major facilities should be government owned? As the years pass by, and space apparatus becomes more reliable, and the work of obtaining scientific data from space acquires a more routine character—certainly many of the necessary operating facilities could be put on a self-liquidating, private-industry basis. . . .

Looking even farther into the future of space exploration, perhaps there would be economic justification for a privately owned launching service that would put objects into space for the peaceful purposes of friendly governments, international agencies, industry, and the universities. The private company would put so many pounds of payload into such-and-such an orbit, at an agreed price. At present, the idea has little appeal, since the government's Scout program will for a time offer this service free to other nations. But as the number and variety of scientific space launchings increases, and other nations no longer wish to be dependent on the United States government, the possibility may be worth exploring. Perhaps the other nations will not wish to invest in duplicate facilities for what is, after all, an operation of planetary scientific significance. This commercially operated launching service would, of course, be strictly for nonmilitary purposes. . . .

Must all future tracking stations, observatories, and data-processing stations be government owned? How about experimental stations for the simulation of space environments? How about laboratories and stations actually constructed in space? Or will privately owned facilities one day offer these services on an international basis to governments, industries, universities, and international agencies? . . .

One of the standard criticisms of the entry of private business into fields requiring such high capital investments, and depending so much in the beginning on government business, is that the government may actually be helping to establish a private monopoly. For example, some years from now there may be enough business for one commercially operated launching service, but not

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Significant as it is, TIROS is a beginning, not an end. Future satellites and space probes will be far more complex. Yet they will grow out of the experience and capabilities in space electronics, satellite dynamics and structural loading techniques that made Project TIROS a reality. To find out how you can draw on this unique research and development capability, get in touch with the Marketing Manager, RCA Astro-Electronic Products Division, Princeton, N. J.

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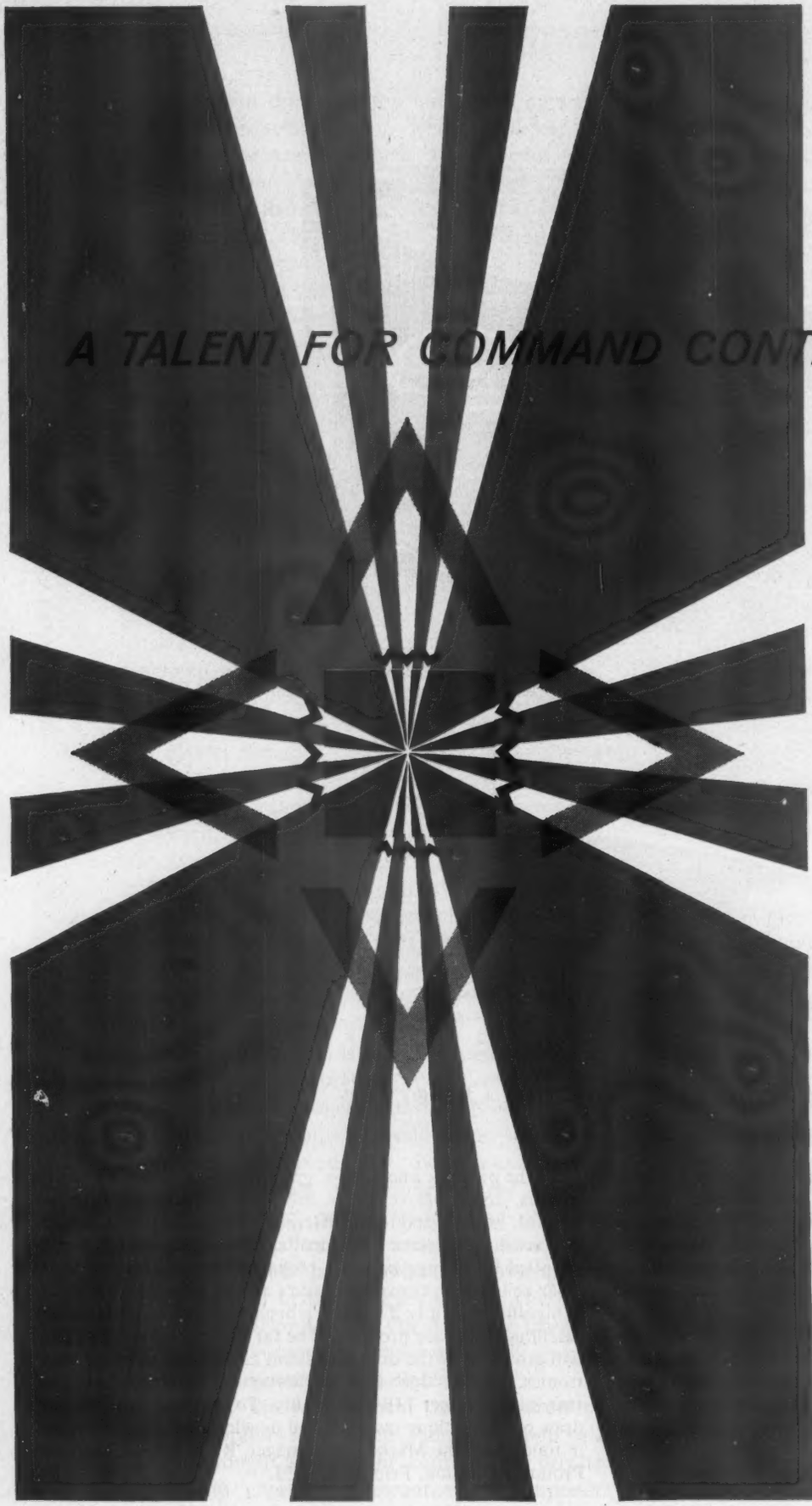

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for several competing facilities. In this case, it is argued, you do not get the advantages of competition, so why not establish a government facility in the first place?

There are three good answers to this argument. One is that the private facility, even if it is temporarily a monopoly, still has to meet the discipline of earning a profit and avoiding a loss, and hence would be more efficient than a government facility; two, the government would in effect regulate this monopoly because it would be the major customer for some time; three, the monopoly would only be temporary. It would serve the important function of laying the groundwork for competitive private enterprise in the particular field, and keep it from being preempted by government enterprise. . . .

As the exploration of space pushes farther and farther out, the "inner space" near the earth becomes sufficiently familiar for the next stage to begin: the stage of economic development.

This stage is a prelude to the time when space will be as familiar as land, and mature commercial businesses can be conducted, [a] period . . . of infant industries and expensive risks.

Most likely the first businesses suitable for commercial operation, using space technologies, will be worldwide communication by satellite, private weather forecasting, and high-speed earth transport by rocket. . . .

Businessmen who believe in the competitive private enterprise system are generally opposed to subsidies, with two classical exceptions: defense industries and infant industries of national importance. Most of the early space business will qualify on both counts.

Here, in my opinion, are the appropriate roles of government and private enterprise in starting these early commercial businesses in space.

The preponderance of the research and developmental work and special facilities should at first be financed by government because of the national interest in establishing United States leadership. But the companies concerned—in their own interests—should also invest in appropriate facilities and manpower to conduct research and development. As an area of space becomes familiar, government-financed research and development should be shifted outward or to other projects of national interest, and private capital should complete the developmental work. . . .

Finally, we come to the stage of mature economic operations in space. As areas of space become familiar, and businesses become established, the government should phase itself out of this area of economic and technical work, and do all it can to encourage the growth of a vigorous competitive private enterprise economy utilizing space resources.

What these commercial businesses in space may be, no one really can say because we know so little about the potentials. Usually one of the first commercial operations in a new frontier area is to bring back raw materials not available in the homeland. It is entirely possible—although many experts now think otherwise—that new or rare minerals and chemicals will be found on the moon and planets, and among the asteroids, that will be unexpectedly useful here on earth.

As space transportation become more reliable and less costly, and the means of sustaining life in space are developed, it may become economically feasible to mine and bring back these rare metals and chemicals, just as it was worthwhile to haul incense and silk halfway around the world in slow-sailing ships five hundred years ago. Some have suggested that, as techniques advance, it might be possible to mount rockets on an asteroid of pure iron or pure nickel—if such exist—and orbit the huge mass of metal down to earth.

With high-grade earth sources of metal becoming scarcer with each passing decade, the idea of bringing in a new Mesabi from outer space may be less fantastic in thirty or forty years than it is now. Perhaps the radiant energy of space can somehow be controlled and made useful. Perhaps new medical resources, or new food resources, can be found on other planets. It does not seem probable, but who is to say? Space travel itself, at first for research and then for commercial purposes, may well develop into an economically profitable competitive business. No one can predict how, or even whether, outer space will offer resources that are useful to man; but some very unpromising frontiers in the past have ultimately been tamed.—END

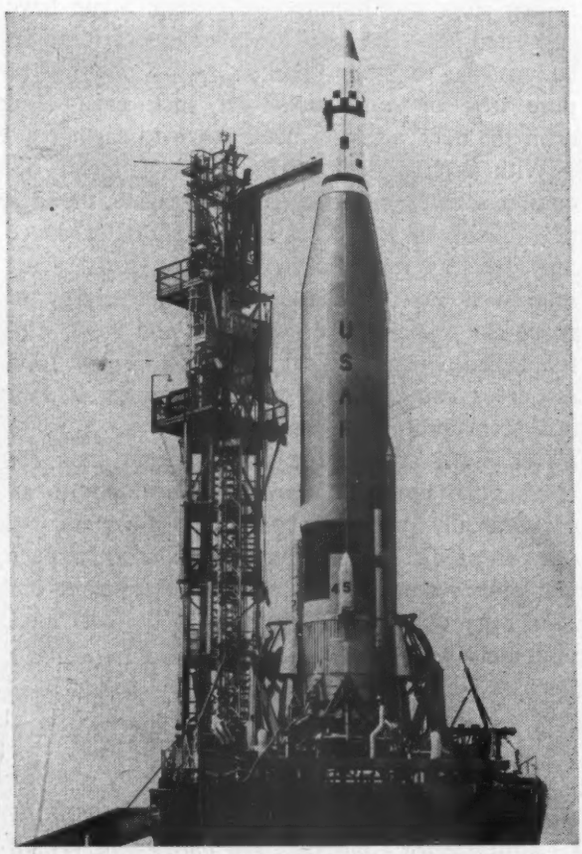
Ralph J. Cordiner is Chairman of the Board of the General Electric Company. The above is excerpted with permission from his recent lecture, one of a series by eminent Americans on peacetime uses of space, at the University of California at Los Angeles. The full series will be published under the editorship of Dr. Simon Ramo, coordinator of the lecture series.

Speaking of SPACE

WILLIAM LEAVITT
Associate Editor

An End to Science Fiction?

Astronautical influences are changing our lives faster than most of us imagine, and in ways which do not all match the oversimplified and incomplete patterns projected by much of the press. There is an interesting parallel here with the confused impact on our thinking affected by the advent of nuclear energy fifteen short years ago, a parallel from which we can learn.



On pad at Cape Canaveral, Fla., USAF's Midas II infrared early-warning test vehicle awaits May 24 launch into nearly circular orbit. Although orbit was attained, telemetry failure precluded planned test of its capability to detect missile launchings. The orbit did not cross the USSR.

When the great bombs blasted Hiroshima and Nagasaki in August of 1945, nuclear energy was recognized as an obviously great new instrument of destruction, which would, of course, have to be barred from use as a weapon ever again. In the brave new world we were hoping to enter, atomics would ease our drudgeries, usher in a new era of push-button industry, and higher standards of living; in short, create a kind of technological heaven on earth. The picture was something in the nature of those artists' conceptions of cities with elevated sidewalks and elongated skyscrapers, scheduled for the magic mid-century year 1950, that we used to see in magazines around 1938.

The atomic utopia never materialized. And, after the first blush of postwar international optimism, it soon became painfully clear that the new world was not much different from the old. For the tyranny of Nazism, there was substituted the more subtle pressure of militant communism, cruelly disguised as a purveyor of economic emancipation to war-shattered lands and to the proto-nations emerging from colonialism.

Now, fifteen years later, after painful disillusionment, the public is only beginning to see the truth that nuclear energy, instead of bringing us our hoped-for brave new world, has become an overwhelmingly important power factor in the struggle between two halves of a polarized world. A curiously negative power factor—in view of the irony that nuclear energy's importance internationally is in terms of its *not* being used. As Columbia University's Margaret Mead points out, this is the first time we have been in the position of training a military force the success of which is measured in terms of the *non-use* of its capability. We deter the Russians by the threat of nuclear force. They increasingly deter us from all but the most self-defensive action against them.

Astronautics, in much the same way, will more and more attain its greatest importance as a factor of international power—and *not* (at least in the foreseeable cold-war future) as a path to new "Americas" beyond our planet. Both nuclear energy and astronautics, examined realistically, are aspects of the scientific revolution which is the startling theme of our times. The two, with electronic advances, add up to what scientists like to call a quantum jump.

Yet the understanding of this basic fact—that new technology revamps the *existing* world rather than creating a totally new world—eludes most of us. The reasons for this lack of understanding are diverse, but some of them are clear enough to analyze.

One significant reason is the shallowness, with only a few distinguished exceptions, of the science reporting in the press. A small minority of newspaper, radio, and television people make any real effort either to get all the available facts right or to explain their real significance. Even the most reputable newspapers carried banner headlines to the effect that a US "spy satellite" was in orbit the day Midas II infrared warning test vehicle was lofted. You had to look deeply into the news stories to find that 1) Midas was indeed a test vehicle; 2) it was designed to check the feasibility of detecting from space by infrared techniques the heat generated by missile launchings; 3) that it was the forerunner of a satellite system for such purposes; and 4) that *Samos,* not Midas, was the name of the program for an actual reconnaissance satellite system. The story was just another news break, played widely the day it happened, not very well explained, but exploited because it was a good follow-on to the U-2 furor.

This is but one example. Anyone closely following news coverage of the US space effort since Sputnik has been consecutively, and in some cases, simultaneously informed that what the Russians were doing was unimportant, very important, impossible to catch up with, and with hard work possible to catch up with and surpass. Only the minority of commentators has taken the time to dig deeper than the surface and to present the public with the sober truth of the necessity for us to create our own astronautic program geared to *our* needs, particularly military needs. Instead, we have been treated to excited accounts of great new but often underfunded engine projects, canonizations of rocket experts as the saviors of the country, and lengthy reassurances by public officials, duly reported, that all will be well—soon.

It is interesting to recall that when Sputnik happened, its importance was minimized by the national leadership, almost, it would seem, because we had not achieved the feat. Only grudgingly did the leadership acknowledge astronautics' significance, and then with an emphasis that became almost pathological in its purely "peaceful" application. The belated admission that space might be "for real" was in contrast with the great romance of "atoms for peace," which we promoted early and hard almost as if we had sole copyright because of our atomic "first." When we did push "space for peace," characteristically we oversimplified and overemphasized our position until anyone who suggested that space technology's most important immediate implication would be military stood the chance of being attacked as a warmonger.

It took the regrettable U-2 incident to create even a minimum public understanding of space technology's potential contribution to our deterrent capability, not to mention the really fantastic possibility of "controlled peace" by means of an internationally operated satellite surveillance system.

C. P. Snow (*see "Bringing the Space Age to the 'Have-Not' Nations,"* SPACE DIGEST, *February '60*), one of the world's leading scientist-writers, gets close to the heart of the matter when he points out that there is an increasing gulf between writers and scientists that must be closed if there is to be any public understanding of the hazardous future. For writers, whether they are journalists, producers of fiction, or the ghosts who give voice to public men, are the communicators to the public. And they cannot persist in conveying confused or romantic representations of the new age without doing severe, perhaps irreparable, damage.

If they are to do a better job, they must have honest help from the scientists who no longer can hide behind high-priest attitudes or claims that their duty ends with discovery. Men like Dr. Edward Teller have risked the "warmonger" epithet to speak out and to communicate unpleasant realities about the impact of technology on a world where morality lags behind scientific advance. But they are still few and far between. The parade of savants who testify at congressional hearings on matters ranging from radiation hazards to rocket propulsion seems almost to take pleasure at leaving hearers befuddled.

Unless there is a quick and conscious effort to separate "space opera" from reality and to communicate the latter to the public, we may well dupe ourselves again.

SEALED IN A SECRET SILO

Somewhere in a wasteland, the Air Force Minuteman will keep its lonely vigil all through a thousand nights. Buried and untended, it must be ready to spring to life if the button is ever pushed.

Minuteman poses a real challenge to the New Reliability—reliability which must guarantee successful firing at any moment in the far future. Each of the missile's systems, each of its thousands of electronic components, must function perfectly at that given moment. For once the missile is lowered into its silo, no human hands again need touch it.

The Minuteman's critical guidance and control system has been entrusted to Autonetics. We are proud to be a member of this United States Air Force missile team.

Once again America's defense force reaps the harvest of Autonetics' pioneering. A decade of experience with major projects has given Autonetics a unique capability in systems management—and in meshing its work with that of other companies in building modern weapon systems.

Guidance Systems by Autonetics

DOWNEY, CALIFORNIA

A DIVISION OF NORTH AMERICAN AVIATION, INC. REGIONAL OFFICES: WASHINGTON, D.C. AND DAYTON, OHIO

INERTIAL NAVIGATION / ARMAMENT AND FLIGHT CONTROL / COMPUTERS AND DATA SYSTEMS

Space Capsules

Soviet scientist PROF. V. B. PARINYY, of the USSR Academy of Medical Sciences, scoffs in the newspaper *Trud* at rumors in the US press that the most recent Russian space vehicle, launched May 15, has a man aboard. Parinyy writes that the mission of Sputnik IV is to strengthen space medical data received back in 1957 when the Russians sent the dog Laika into orbit. He claims that Soviet scientists (*sic*) have created a new branch of medicine—space physiology—and that eventually they hope to have all the answers prerequisite to safe launch and return of a man into space. . . . Backed by the *Guggenheim Foundation,* the *International Astronautical Federation* is setting up an *International Academy of Astronauts.* Chairman of the Academy's founding committee is the noted DR. THEODORE VON KARMAN. Functions of the Academy will include scientific studies and reports, publication of an international journal, and award of prizes to spur peaceful space research.

Just to add to the fuel, time, and space-medical problems of a trip to Jupiter, the planetary substance of which might best be described as poisonous sherbert, the Navy announces that research at *California Institute of Technology* proves almost conclusively that the giant planet is surrounded by a vast Van Allen-type radiation belt. The studies were done with Caltech's new twin ninety-foot radio telescopes, which detected radio waves emitted by high-speed electrons trapped in Jupiter's magnetic field. Polarization of the emitted particles indicates presence of a radiation belt. Direct prediction that follows is that man may be unable to travel beyond Jupiter's outer moons.

DONALD ROBEY, who wrote recently in SPACE DIGEST on his theory that "flying saucers" are incoming remnants of cosmic icebergs, suggests in the February issue of the *Journal of the British Interplanetary Society* some interesting uses of instant freezability in space. Why not store fuels and wastes in frozen form outside the spaceship, or even put space stations together using frozen liquids as cement? he asks. . . . If you live in the Pittsburgh, Pa., area, your youngsters can sign up for the *Third Annual Junior Space Academy* at the *Buhl Planetarium.* Buhl, with cooperation of the Pittsburgh *Post-Gazette* and radio stations WIIC and WWSW, is offering seventeen different

Lockheed Human Factors Research Laboratory specialists examine model of "null-gravity" simulator, huge revolving tank of water in which subject will be placed to gain data on human reactions to in simulation of the weightless state. At left, Dr. Raphael Levine; right, Dr. Jack Kraft.

Mercury Astronaut will watch the world turn via this Minneapolis-Honeywell miniature globe mounted in capsule. Little globe will revolve to correspond to earth's movement, tell the Astronaut where he is, help him in the return maneuver.

SPEAKING OF SPACE

science courses for eight-to-fourteen-year-olds from June 27 to September 3, including lectures on astronomy, space mathematics, and telescope making.

ARTHUR C. CLARKE, probably the world's best known and most urbane science and science-fiction writer (*The Exploration of Space*, etc.) has a delightful but frightening story in the May issue of *Playboy* magazine, entitled "I Remember Babylon." The tale projects how in the near future the Reds discover the ultimate weapon, space-transmitted TV. Why ultimate? Because, as Clarke relates, they plan programming that no one, but no one, will want to miss. . . . Some interesting figures on US scientists as released by the *National Science Foundation*, applying to the years 1956-1958: Median annual salary: $7,900; median age: thirty-eight; highest median salary, $11,000, to those in management or administration; highest median scientist salaries, $10,000-plus to those in chemical, engineering, and medical sciences; lowest median salaries, less than $7,000 to those in agricultural and biological sciences. Some 137,000 scientists reported in 1956-58. Nearly half were in private industry or self-employed. Some twenty-eight percent were with educational institutions, and fourteen percent with the federal government.

Worth reading: the May issue of *Aero/Space Engineering*, the Journal of the Institute of the Aeronautical Sciences. It's devoted to manned space stations and contains texts of papers presented at a May symposium on the subject cosponsored in Los Angeles by IAS, the RAND Corp., and National Aeronautics and Space Administration.

An interesting survey of biological sciences and space research (chapter nine of a nine-part series) has been published by the *National Academy of Sciences*. Write to Printing and Publication Office, *National Academy of Sciences*, 2101 Constitution Ave., N.W., Washington 25. D.C., for your copy. Price is $1. Other titles in the series: *Physics of Fields and Energetic Particles in Space; The Nature of Gravitation; The Earth; The Sun; The Moon; The Planets; Galactic and Extragalactic Astronomy;* and *A General Review*.

We are guilty of an astronautical goof in last month's issue. Captions got flipped and a photo of a *Lockheed* human factors research project model was described as a Mercury Astronaut map orientation aid. We repeat the Lockheed picture—with correct information—*and* the Astronaut mapping aid (*see cuts page 97*).—END

Jack Tippit

"Think we should shell it first?"

ALPHA CAPABILITIES

Systems competence in design, implementation, structural construction, installation, operation, training, and maintenance of:

1. *Space surveillance systems*

2. *Transportable electronics systems*

3. *Instrumentation, control, and switching systems*

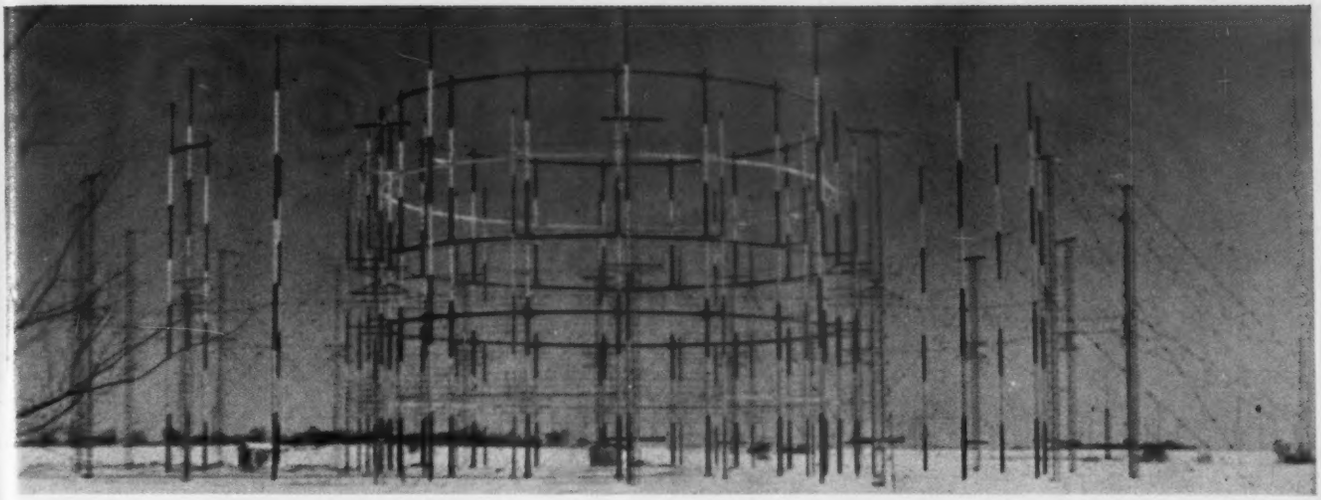
4. *Telecommunications systems*

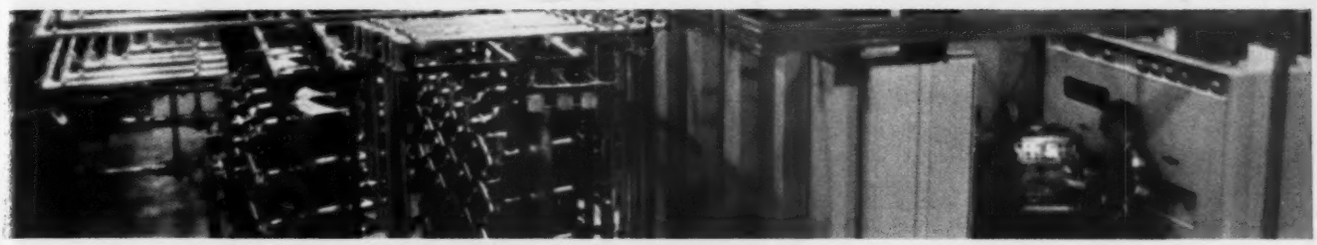
5. *Integrated land, sea, and air communications systems*

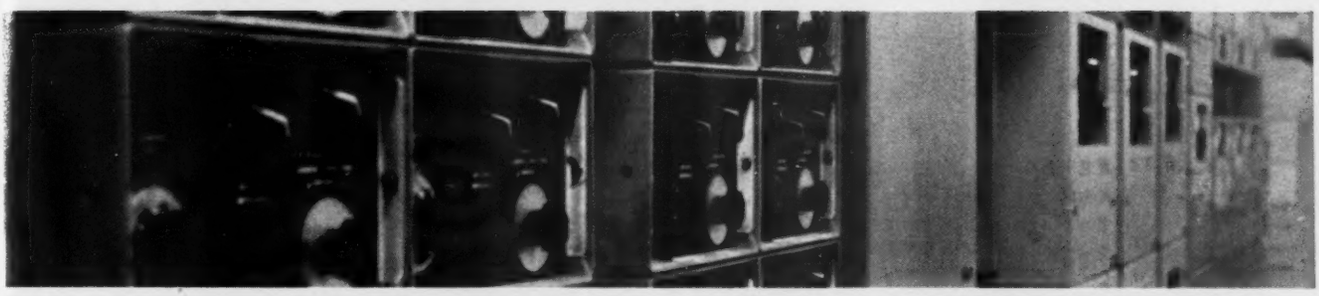
6. *Data systems*

Alpha CORPORATION

CABLE • ALPHA DALLAS







SHORT ORDER **SAC's Global Voice . . .** provides a vital communication link of intercontinental range with the speed and reliability necessary for positive control of modern jet aircraft. The system design concept is advanced and flexible. SHORT ORDER may be used for point-to-point communication with missile-launching sites as well as for its initial employment by the Strategic Air Command jet bomber force.

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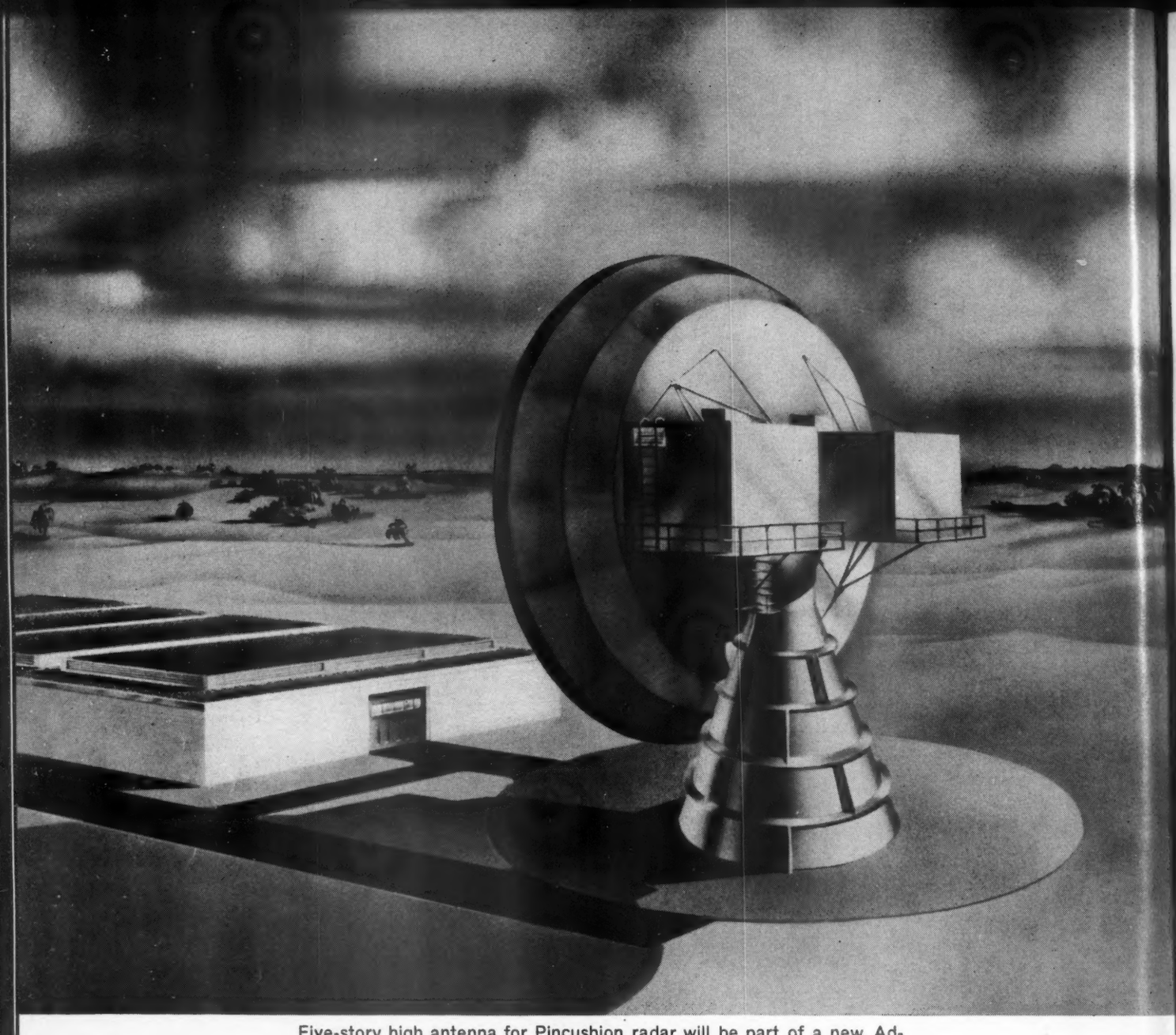
ICONORAMA DISPLAY SYSTEMS

Fenske, Fedrick & Miller, Inc. will provide an ICONORAMA System for the BMEWS Program under subcontract to RCA, prime contractor for this missile detection system. ICONORAMA is a plotting and display system that records the movement of multiple objects and instantaneously projects the paths of the objects on a display area. ICONORAMA is the first and only system that can graphically record in multiplicity, variable information for projection viewing, creating both two dimensional and three dimensional systems. Thus, ICONORAMA contributes to BMEWS, the first electronic system designed to give early warning against ICBMs. ■ ICONORAMA Systems are in use at major missile testing sites, including White Sands Proving Ground, Pacific Missile Range and Cape Canaveral. Other ICONORAMA Systems are also being installed at both the Headquarters of North American Air Defense Command (NORAD) and Strategic Air Command (SAC).

FENSKE, FEDRICK & MILLER, INC. • **12820 Panama Street** • **Los Angeles, California**

a subsidiary of TEMCO AIRCRAFT CORPORATION, ***Dallas, Texas***



Five-story high antenna for Pincushion radar will be part of a new Advanced Research Projects Agency installation to be set up in mid-Pacific.

A unique radar designed to track and identify the warhead of ICBMs thousands of miles away is now being developed by Raytheon.

Designated "Pincushion", because of its microwave beam pattern formation, the 80-ton Raytheon radar will be part of Project Defender, ARPA's program to develop advanced anti-ICBM concepts.

RAYTHEON COMPANY, WALTHAM, MASS.

RAYTHEON

EXCELLENCE IN ELECTRONICS

AIR FORCE
JULY 1960

Today's reserves comprise a significant portion of this nation's over-all aerospace capability. At the same time, declares USAF's Chief of Staff, it has become apparent that only through ever-modern organization can we achieve peak utilization of our . . .

Citizen Soldiers in Aerospace

Gen. Thomas D. White, USAF
CHIEF OF STAFF
UNITED STATES AIR FORCE

TRADITIONALLY, the reserve forces of the United States have comprised a pool of military manpower and units available to expand our forces rapidly toward required wartime strength. In every war in which the United States has been involved, these "citizen soldiers" have been a most important factor in achieving our national security objectives.

Nevertheless, in recent years it has become apparent to the Air Force that something more than a pool type of reserve force would be required in the event of future wars. To be truly effective in the modern era of ballistic missiles, supersonic aircraft, and nuclear weapons, our air reserve forces must be an "in-being" part of Air Force combat and support capabilities—comparable in effectiveness and readiness to our first-line active units.

Today, our air reserve forces do comprise a significant portion of this nation's over-all aerospace capability. An idea of the current importance of our air reserve forces in terms of total force can be gained from the fact that two-thirds of the tactical reconnaissance units, nearly half of the tactical fighter units, and more than three-fourths of the troop carrier units available to the Tactical Air Command in an emergency are contained in the Air National Guard and Air Force Reserve. In addition, a considerable portion of our interceptor fighter defense capability is in the Air National Guard.

Despite these substantial contributions, it has become apparent, through comprehensive study of the possible uses of the air reserve forces, that there is additional potential in these forces—a potential which if efficiently managed would result in better utilization of our total Air Force resources—both in wartime and in peacetime. Consequently, the Air Force approved a new plan for the management of the air reserve forces—a plan generated in response to several factors. These included: The necessary and vital role that the Air National Guard and Air Force Reserve play in our present-day over-all aerospace power; their proven capability to perform wartime missions; the desire to find more useful missions that the reserve forces could effectively and economically accomplish; and the requirement to gear the combat and support units to a much higher degree of operational readiness.

The high cost of maintaining aerospace power and the comparatively lower cost of using reserve forces to perform some of the necessary functions of the Air Force mission clearly indicate the desirability of assigning to the air reserve forces greater responsibilities in certain areas. In many cases these forces already have demonstrated their capability to assume such responsibilities.

Fine as the record of the air reserve forces has been, the Air Force and members of the air reserve forces must jointly continue to exert every effort toward improving the value and usefulness of the reserves. In this respect, the new management plan for the air reserve forces provides for a closer integration of the reserves into the active establishment than ever before. It accomplishes this by placing the responsibility for peacetime supervision of training and for the measurement of training progress and capability of reserve force units in the hands of the Air Force commands which would have operational control over these units in an emergency.

The new plan also puts the vast and virtually untapped reservoir of planning and management ability in the reserve forces to work by providing for much of the management of the Air Force Reserve program to be done by reservists themselves—in region headquarters as well as in local units.

The plan also provides—in addition to the specific new missions—for the assignment of additional missions to the reserve forces whenever such missions will improve the Air Force's over-all capabilities.

I am confident that implementation of this plan will result in greater contributions by the air reserve forces to the over-all Air Force mission and will permit more effective and economical utilization of our total Air Force resources. This, in turn, will enable the Air Force to perform its share of the total national defense task more efficiently.—END

NEW ACCENT ON THE AIR RESERVE FORCES

Fundamental factor that made the current reserve reorganization possible, writes the reserve program's civilian chief, was the high degree of combat readiness shown by the reserve forces. This condition of readiness harmonized with today's realization that there is but . . .

ONE COMBAT TEAM

Lewis S. Thompson

SPECIAL ASSISTANT TO THE SECRETARY OF THE AIR FORCE FOR MANPOWER, PERSONNEL, AND RESERVE FORCES

THIS issue of AIR FORCE Magazine signals the beginning of implementation of the new management plan for our air reserve forces. It is my purpose here to describe the reasons and events leading to this new concept. Other articles in this section of the magazine will fill in the details.

The fundamental factor which made this new program possible was the high degree of operational readiness achieved in both the Air National Guard and the Air Force Reserve. Air Force planners have become increasingly aware of this operational readiness and the potential of the air reserve forces to take on more missions, both in numbers and in degree of priority.

Therefore, in order to encourage and foster continued progress toward full operational readiness and to ensure that the reserve forces are used to their fullest productivity in our military posture, the decision was made to integrate the air reserve forces more closely with the respective gaining commands of the Air Force.

This decision came after a searching review of roles and missions, force structure, and management of the air reserve forces.

These were some of the facts that played a part in our thinking:

- The air reserve forces have reached their highest degree of peacetime operational readiness.
- Members of the air reserve forces are eager to accept realistic missions.
- Getting the greatest value from our defense dollar without sacrificing combat capability is an economic necessity.
- It costs less for the air reserve forces to do some jobs.
- If further progress is to be made, more realistic training must be provided.
- This more realistic training can best be provided by USAF gaining commands.

In June of 1959, the then Under Secretary of the Air Force, the Hon. Malcolm MacIntyre, called for a review of the reserve forces program. Working groups of reserve and regular officers began organized studies of the problem.

In October of last year, the Reserve Review Group, chaired by Maj. Gen. Sory Smith, Fourth Air Force Commander, convened for nearly thirty days.

All interested organizations, both military and civilian, including the Air Force Association, were invited to meet with the board and offer their suggestions.

The ensuing conclusions of the Air Staff were then considered by the Air Reserve Forces Policy Committee at a special meeting January 25-27. This is the statutory committee comprised of Air Guardsmen and Air Reservists who recommend policies affecting our reserve forces.

Then, supplied with all facts available from the Reserve Review Board and the Air Staff, plus clarifications recommended by the Reserve Forces Policy Committee, Secretary Sharp made the decision on February 2 to implement the plan as modified in his office.

The plan is the product of many months of study. Policy makers from the gaining commands, senior officers from both components of the reserve forces, and Air Staff planners all contributed ideas and suggestions before the final decision was made.

In summary:

- Our objective is to have in-being reserve forces that are "ready now."
- We in the Air Force are actively seeking new roles and missions in which the air reserve forces will improve our over-all military posture.
- We are using every available means to ensure that our policies and decisions are compatible not only with our Air Force commitments, but also with the capabilities of the air reserve forces.

The over-all objective has been well expressed in these words of Secretary Sharp:

"In the cold-war environment in which we find ourselves today, the Air Force must rely on all its operational and support units—the part-time as well as the full-time components. The traditional 'back-up' philosophy that once applied to Air Guard and reserve forces no longer holds true. There is no 'second team' in the Air Force. Active units, Guardsmen, and reservists jointly form one first-string deterrent force now. And if war is forced upon us, all immediately become one combat team."—END

NEW ACCENT ON THE AIR RESERVE FORCES

Major changes under the new reserve plan fall into six major categories. Reserve forces field responsibilities will be decentralized. Concurrently, a stronger focal point for reserve matters will be established at Headquarters USAF to provide . . .

COORDINATION FOR PROGRESS

Maj. Gen. Robert E. L. Eaton, USAF
ASSISTANT CHIEF OF STAFF
FOR RESERVE FORCES

MAJOR changes under the new plan for management of the air reserve forces fall into six major categories. These are:

1. Strengthening of centralized control of reserve forces programs and policies in one agency at Headquarters USAF, under the integrated staff concept.

2. Reassignment of Continental Air Command's responsibilities for supervision of training and inspection of the Air National Guard to other Air Force major commands.

3. Sharing of responsibilities for the Air Force Reserve program among CONAC and the other commands.

4. Reorganization of CONAC in line with the revisions in its mission.

5. Increased emphasis on reserve participation in management of the program.

6. Assignment of new roles to the air reserve forces.

No one of these major changes can be examined clearly detached from the others. For instance, the increase in reserve participation in management can be seen as a factor of both CONAC reorganization and assignment of new reserve roles. Integration of reserve forces units into "gaining" commands—TAC, ADC, MATS, and others—and resulting decentralization of field responsibilities is related to establishment of a stronger focal point for the reserves at Headquarters USAF.

For a number of years, our air reserve forces program has been developed under what is known as the integrated staff concept. Within this concept, each agency of the Air Staff develops policies and programs within its area of responsibility for the reserve components as well as the Regular Air Force. The Deputy Chief of Staff for Personnel formulates policies and publishes directives pertaining to reserve personnel. Other deputies and directors do likewise within their areas of responsibility.

Assurance that the reserve forces were given proper emphasis has come in the past from the fact that, with field supervision of the program centralized under Continental Air Command and the National Guard Bureau, these agencies could go directly to the Air Staff agency concerned and work out any differences that arose. In addition, the Chief of Staff has kept a watchful eye on the program through the Assistant Chief of Staff for Reserve Forces who is charged with monitorship and surveillance of all reserve programs.

In order to bring about close integration of reserve forces units into the commands which would use them in an emergency, while maintaining standardized administrative procedures and adequate support, training and inspection responsibilities have now been spread throughout the Air Force. Remaining field responsibilities for the Air Force Reserve have been retained in Continental Air Command. The plan does not change any of the responsibilities of the National Guard Bureau and the states for the Air National Guard. This decentralization of responsibilities makes it essential that there be a focal point in Headquarters USAF, charged with over-all control and direction of reserve forces matters.

The Chief of Staff has designated the Office of the Assistant Chief of Staff for Reserve Forces as the Air Staff office of primary interest for all matters pertaining to the Air National Guard of the United States and the Air Force Reserve.

In this capacity, this office has the primary responsibility for ensuring that Air Force policies and programs for both components are effectively implemented at all echelons. This office is also the Air Staff point of contact with the National Guard Bureau and the Continental Air Command for matters relating to their responsibilities for the respective components of the air reserve forces.

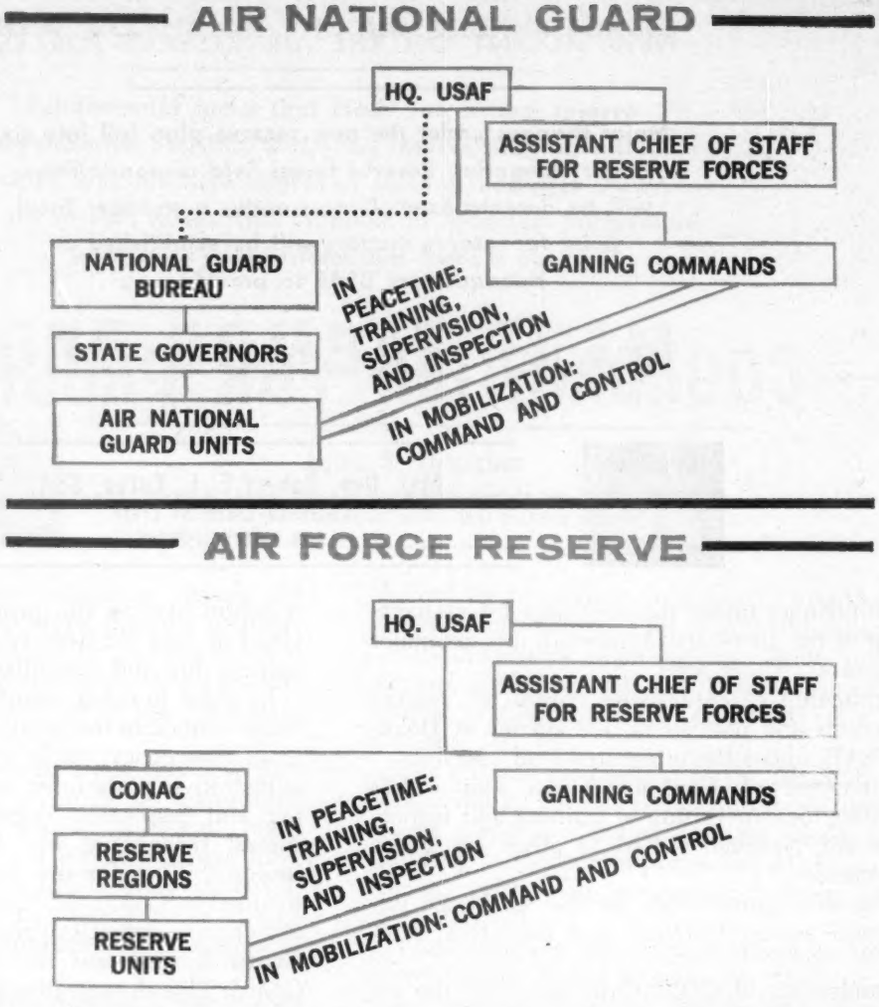
Related responsibilities include liaison with nonmilitary agencies and organizations interested in reserve forces programs, and Air Staff responsibility for the Civil Air Patrol.

Development and support of reserve forces programs will continue to be provided under the integrated staff concept.

As in the case of Continental Air Command, new responsibilities call for revised organizational structure for the Office of the Assistant Chief of Staff for Reserve Forces.

In the capacity as executive agent for the Chief of Staff, the Assistant Chief of Staff has direct access to the Chief whenever a matter requires a top-level

(Continued on following page)



Charts show, top, the relationship of gaining commands to the Air National Guard under new system, and bottom, the Air Reserve flying units' link with gaining commands with inception of current concept. The commands will have more direct supervisory role to play within the over-all reserve program.

decision. In addition, he acts as an adviser to the Air Force Council when that body is considering reserve forces matters. He maintains liaison with the Departments of the Army and Navy on matters of mutual concern and serves as an Air Force member of the Reserve Forces Policy Board at Department of Defense level.

A Deputy for Air National Guard, Maj. Gen. Winston P. Wilson, and a Deputy for Air Force Reserve, Brig. Gen. Felix L. Vidal, are responsible for surveillance of their respective programs to preclude duplication of effort and to ensure timely and effective support. They maintain close liaison with Air Force major commands pertinent to air reserve forces matters, and present and defend funding appropriations for the air reserve forces before Department of Defense and congressional reviewing authorities.

The position of Deputy for Air National Guard, by arrangement with the Chief, National Guard Bureau, is additional duty for the Assistant Chief of the Bureau for Air National Guard Affairs. This arrangement does not alter the responsibilities nor the legal authority of the Chief of the National Guard Bureau.

Five functional elements have been formed to handle the responsibilities of the office. The chiefs of these staff segments report directly to the Assistant Chief of Staff.

The Plans and Policy Division works with other agencies of the Air Staff in the formulation and development of over-all concepts, mission assignments, and force structure for the Air National Guard and the Air Force Reserve. This division will be headed by an Air Force officer, and its staff will include one Air National Guard officer and one Air Force Reserve officer assigned under Section 8033, Title 10, United States Code.

The Personnel Division provides guidance to staff agencies on proposed legislation and changes to existing laws affecting the reserve forces. It will also review requirements for establishment of Section 8033 and Section 265 positions in Headquarters USAF, and in the major commands. The Personnel Division will include Section 8033 officers from the Air National Guard and the Air Force Reserve.

The Programs Control Division works with the Air Staff in the formulation and development of programs and policies directed toward achievement of Air Force plans and objectives for the reserve forces. These include operational programs, those in support of operational requirements, and fiscal support programs. The division will also furnish assistance in the preparation, presentation, and defense of fiscal support programs before review agencies and will perform a continuing analysis of the status of programs of the Air National Guard and Air Force Reserve. An Air National Guard 8033 officer will be assigned to this office to provide expert knowledge of the programs of this component.

Air Reserve Forces Policy Committee receiving a field briefing on Reserve and Guard activity. This committee, chaired by Guard Maj. Gen. Clarence A. Shoop, reports to the Secretary of the Air Force on policy matters that relate to reserve forces programs. Committee is made up of members from Reserve, ANG, Regular establishment. It normally meets twice yearly to consider reserve matters.

The Field Operations Division monitors the activities of Air National Guard and Air Force Reserve units and the reserve forces training programs of Continental Air Command and the other major commands. Its area of interest includes mission capabilities and readiness of reserve forces units and the effectiveness of training. The staff of this office, like those of the Plans and Policy Division and the Personnel Division, will include an 8033 officer from each reserve component.

The Information and Liaison Group monitors the public and internal information aspects of the air reserve forces programs. This office works closely and continuously with the Chief of Information, Office of the Secretary of the Air Force, to assure that reservists, members of the Air Force, and the general public are fully informed regarding the air reserve forces. It provides continuous liaison with the Reserve Forces Policy Board of the Office of the Secretary of Defense and with the Air Reserve Forces Policy Committee. It is the Air Staff focal point for contact with nonservice organizations such as the Air Force Association. The group is headed by an Air Force Reserve 8033 officer and its staff includes a 265 officer from each reserve component.

The reorganization provides for an increase in manning from a total of twenty-one to a new total of thirty-four military and civilian personnel.

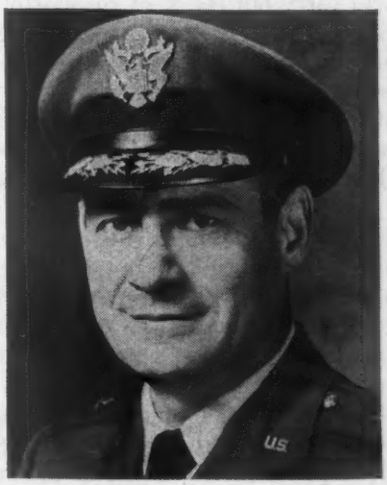
The Office of the Assistant Chief of Staff for Reserve Forces has a greatly expanded responsibility under the new management plan. Its key position makes its effectiveness a vital factor in the success of the over-all plan.

The authority necessary to carry out the responsibilities is assured by the fact that the Assistant Chief of Staff not only acts as an adviser to the top policy makers of the Air Force but also has direct access to the Chief of Staff.

The reorganization of the office into functional elements provides a point of contact with each important area of the Air Staff and with all types of reserve forces activities. The better than fifty percent increase in the personnel of the office provides the capability to carry out the expanded responsibilities and the inclusion of 8033 officers from both the Air National Guard and the Air Force Reserve provides firsthand knowledge of the problems of both components.

In short, the Office of the Assistant Chief of Staff has been strengthened to provide a point where all elements of the program can be coordinated to assure that the air reserve forces continue to progress toward providing the greatest possible contribution to over-all Air Force capability as an instrument of national policy.—END

Above, Maj. Gen. Winston P. Wilson, Air National Guard Deputy to the Assistant Chief of Staff for Reserve Forces, Deputy Chief, Guard Bureau, and Chief of its Air Division.



Brig. Gen. Felix L. Vidal, Air Reserve Deputy to the Assistant Chief of Staff for Reserve Forces. A former reserve wing commander, he has long reserve forces record.

General Eaton has held his current post since August 1959. He formerly served as Director of Legislative Liaison, USAF; Commander, Sixth Allied Tactical Air Force, Turkey; and Commander, Tenth Air Force, Selfridge AFB, Mich. General Eaton, a West Point graduate, served as Director of Operations, US Strategic Air Forces in Europe, during the second World War.

NEW ACCENT ON THE AIR RESERVE FORCES

CONAC undergoes major reorganization under the new reserve forces setup. It no longer will be responsible for the training and inspection of existing Air National Guard and Air Force Reserve flying units. Nevertheless, the command retains a lengthy list of missions under . . .

CONAC's New Look

Lt. Gen. William E. Hall, USAF
COMMANDER, CONTINENTAL AIR COMMAND

CONTINENTAL Air Command is currently in a state of transition. Many of the actions called for in the "Plan for Revised Management of the Air Reserve Forces," issued by the Department of the Air Force on May 20, were to be initiated by July 1. All of them must be completed by January 1, 1961. But it is far too early to tell what the ultimate impact will be on the so-called "new" CONAC.

It is not too early, however, to outline the missions and responsibilities of Continental Air Command in the future, to appraise some of the obvious benefits of the plan, and to indicate those areas which may involve question marks.

Air Force Regulation 23-1 sets forth the mission of CONAC as follows:

"Within the United States (less Alaska and Hawaii) CONAC will carry out the field responsibilities of the Chief of Staff, USAF, for command of the Air Force Reserve and responsibility for the logistical, budgetary, administrative, and personnel functions; recruiting; assignment of reserve personnel; training and inspection of Air Force Reserve units for which CONAC is designated as the wartime gaining command, and such individual reservists as may be directed by Headquarters USAF. CONAC will provide other major commands assistance as required in recruiting personnel to meet augmentation requirements. In the event of war or national emergency, CONAC will order to extended active duty those units and individuals of the Air Force Reserve for whom CONAC is designated as the wartime gaining command, and such other individuals as may be directed by Headquarters USAF."

Although its prime function will be the management of the Air Force Reserve, CONAC will still retain a number of other major responsibilities. Among them being: OCDM liaison, Air Sea Rescue coordination, Civil Air Patrol management, Air Explorer program, and Selective Service liaison.

The Revised Management Plan will result in a much simplified, streamlined CONAC, and certain major changes in the management of the reserve forces are to be effected. Chief among these is the transfer to gaining commands of the supervision of training and inspection of existing Air National Guard and Air Force Reserve units. This means, for one thing, that CONAC will no longer have any responsibility for the Air National Guard.

Continental Air Command, by the way, is extremely proud of the high degree of readiness that has been achieved in the units of the reserve forces in the very few years of its "ready-now" training concept. Most of the units have achieved a satisfactory degree of immediate combat capability. This has been evidenced by such realistic exercises as Pine Cone II and the highly successful Swift Lift Operation. It is to be hoped that this degree of readiness will be maintained and improved by year-round training of reserve units by the gaining commands.

Continental Air Command will be responsible for the logistical, budgetary, administrative, recruiting, and personnel support of the Air Force Reserve. With the responsibility for the Air Force Reserve divided between the training and inspection missions of the gaining commands and the command and administrative missions of CONAC, it is obvious that the effective management of the reserve will require the very utmost in cooperation among all the commands concerned.

Another major change in the Revised Management Plan is that in many areas qualified inactive-duty reservists will be utilized to operate subordinate reserve elements. While it is true that the flying wings of the reserve are managed by reservists, it must be remembered that a certain number of those reservists are actually Air Reserve technicians, civil service employees who administer the wings on a full-time basis. So far, there is no plan for providing ART personnel for other type units. There must be a slow progressive program of leading part-time reservists into a program of administering these units on a continuing basis with the help of a small number of active-duty "liaison" personnel. Utilization of inactive-duty reservists for management may impose on CONAC a more severe motivation problem than has obtained in the past.

A word now as to the future structure of Continental Air Command. The three numbered Air Forces now in existence will be replaced by six numbered Air Reserve regions corresponding with numbered Army areas—three by July 1 and three more by October 1. Headquarters of these regions will have a hard core of per-

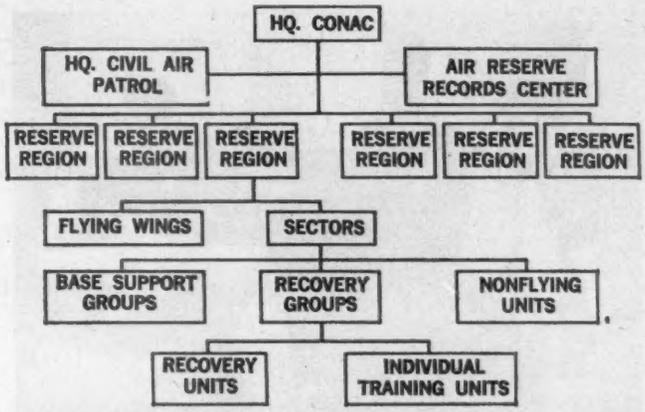
manent party personnel augmented by inactive-duty reservists. In actual figures, the plan calls for each reserve region to be staffed by a total of 117, eighty-five of whom will be reserve mobilization assignees. The commander will be an Air Force general officer and his deputy will be a reserve general officer. The present individual training wings will be redesignated as "sectors."

A most challenging aspect of the Revised Management Plan is to be found in the activation of postattack "recovery units." A pilot program will be initiated by September 1, 1960. Six recovery groups and six base support groups will be activated by that time and their effectiveness monitored from September 1, 1960 to June 30, 1961. The CONAC structure from July 1 on, then, will consist of a headquarters, six Air Reserve regions, Headquarters Civil Air Patrol, and the Air Reserve Records Center, plus subordinate units.

It is noteworthy that CONAC retains responsibility for recruitment of the entire Air Force Reserve. This promises to require a more intensive effort than ever, if the present levels of participation are to be maintained and if the new recovery units are to be fully and properly manned.

It is apparent that the top problem concerning CONAC today is the speed with which the Revised Management Plan is to be implemented. The CONAC staff at Headquarters is making every effort to assure that the target date of January 1, 1961 will see the plan in full and successful operation.—END

— CONTINENTAL AIR COMMAND —



How the new management system affects the Continental Air Command. Three numbered Air Forces (4th, 10th, 14th) are abolished, six reserve regions added. Also added are reserve sectors, base support groups, and recovery units.

General Hall, Commander of CONAC since 1957, was previously Assistant Chief of Staff for Reserve Forces. A West Point graduate, he served for three years in the field artillery before entering flight training in 1933. He served in Europe during World War II, later was USAFE Director of Intelligence during the Berlin Airlift. He has also been USAF's Director of Legislative Liaison.

NEW ACCENT ON THE AIR RESERVE FORCES

From here on, the Air National Guard will train under direct supervision of USAF gaining commands. Guardsmen would be an integral part of parent commands in an emergency. In peacetime, they also contribute materially to the mission capabilities of major commands . . .

Flying in Formation

Maj. Gen. Winston P. Wilson, USAF
CHIEF, AIR FORCE DIVISION
NATIONAL GUARD BUREAU

JULY 1, 1960 was a historic date for the Air National Guard. On that day, the Air Guard formally joined the Air Force's first team.

Until now we have been trained by one command to serve with another. That system worked and worked well. It is a measure of CONAC's success in rearing us that we can now take our place in USAF's major operating commands. Now Air Guardsmen will train under direct supervision of the USAF gaining commands.

This mobilization assignment concept, however, does not completely express the close working relationship we maintain with our gaining commands. For, while we would be an integral part of our parent commands in an emergency, we also contribute to their mission capability in our present status.

(Continued on following page)

Air National Guard ground crewmen make some last-minute adjustments on aerial rocket prior to modern firepower demonstration. All the Air Guard units are combat ready.

Crews from twenty Air Guard interceptor squadrons stand runway alert for the Air Defense Command every day in the year, at points selected by ADC to fill in the US air defense network. Our planes are armed and ready, responding within five minutes to ADC's scramble orders.

We have flown close-support firepower demonstrations for the Tactical Air Command. We have joined in maneuvers with Army forces from Puerto Rico to Alaska and have helped test NORAD's defenses in penetration runs from all points of the compass.

Soon we expect to begin hauling heavy cargo under MATS control, and by this time next year we will be ready to airlift combat troops.

How does the Air Guard shape up as CONAC turns over its training responsibilities to the gaining commands? I think the question can be answered by reviewing the Air Guard's capabilities in three categories —manpower, training, and equipment.

In manpower, we are just about at our full authorized drill pay ceiling of 72,000 officers and men. Our recruiting problems are minor. Most of our units have a waiting list of qualified candidates. Our reenlistment rate is the highest in Air Guard history—more than eighty percent. Our 13,000 full-time technicians—officer and enlisted—are the nucleus of our force, providing skilled direction and strong motivation and leadership throughout our units.

Training of individuals and units within the Air Guard is directed toward combat readiness. Our aircrew readiness averages about seventy percent in all our flying units. We are trying to build readiness of other than aircrew personnel to the same level, because we are well aware that the ability to conduct sustained combat operations depends as much on the men in the warehouse and the dining hall as on the pilots and ground crews.

Training pays invaluable dividends in peacetime. Witness our steadily improving flying safety record. Actually, combat readiness and flying safety go together because both are a product of skilled pilots and ground crews and alert, capable leadership.

Fifty-two of our aircraft squadrons went through the entire year of 1959 without a major accident. Our over-all accident rate in 1959 was 14.2 per 100,000 flying hours—by far the lowest in Air Guard history.

The third basic ingredient of a capable combat force is equipment. The hottest squadron in the Air Force wouldn't get far flying Jennies today. We are only kidding ourselves and wasting the taxpayer's money if our weapon systems are unable to deliver a knockout blow.

On the other hand, we need to be sure we have the kind of equipment that might be necessary in a variety of combat situations. We are retaining versatility in the types of aircraft being added to the Air Guard.

In the next twelve months, many of our squadrons will be equipped with Century-series planes, including F-100s, F-102s, and F-104s. Our other air defense squadrons fly the F-86L and the F-89J, while the fighters use the F-84F and TAC reconnaissance units the RF-84F and RB-57.

Meanwhile, as the manned interceptor gradually gives way to the air defense missile, the Air Guard is shifting to other essential missions. One is long-range airlift. We now have six C-97 squadrons, and we hope to convert several more squadrons to airlift before long.

We also hope to convert some of our squadrons to tanker aircraft for inflight refueling support of the Air National Guard's tactical fighter force. The combination of Air Guard refueling squadrons, tactical fighters, and long-range heavy transports will assure the Air Force of a realistic and effective backup for Tactical Air Command's Composite Air Strike Force.

As a lifelong Guardsman, I have unshakeable faith in the National Guard system. It is working as well today as when it first came into being to serve our country's needs. Our ability to assist and serve side by side with the active establishment in the conduct of realistic training exercises has been a source of deep personal pride and satisfaction—not only for myself, but for the participating units. Our major emphasis in the future will be advancing still further toward our goal of full combat readiness.

During this dawning space age, and in times of rapidly changing conditions, this new management system will provide us with an increased capacity to respond on a more timely and effective basis. I highly endorse this new system and consider it a positive step forward in the management of the air reserve forces.

In summary, Air Guardsmen on this historic date of July 1, 1960, are eager to demonstrate their ability to fly in formation with their active-duty counterparts.—END

General Wilson has headed the Air Force Division of the National Guard Bureau since January 1954. The following year he was named Deputy Chief of the Guard Bureau. General Wilson first joined the Arkansas National Guard in 1929 as a mechanic, won his CAA pilot's license in 1936, flew East Coast antisubmarine patrols and served as an aerial photography officer in the Pacific in World War II.

NEW ACCENT ON THE AIR RESERVE FORCES

The Tactical Air Command would fall heir to seventy percent of air reserve forces in the event of war. TAC welcomes its heightened responsibilities under the new reserve organization, writes its Commander, in the interests of . . .

READINESS, REALISM, AND ECONOMY

Gen. Frank F. Everest, USAF
COMMANDER, TACTICAL AIR COMMAND

THE air reserve forces provide the depth and staying power which are indispensable to the conduct of extended air operations. The impending transfer of the training and inspection responsibility for these forces to their wartime gaining commands should further increase their effectiveness and consequently afford a greater return on the nation's investment in them.

Of the several major air commands affected by this move, the Tactical Air Command (TAC) will receive the greatest impact. In the event of war, TAC will fall heir to twenty-seven Air National Guard and Air Force Reserve wings, roughly seventy percent of the air reserve forces. Combat-ready reinforcements of this order could conceivably spell the difference between victory and defeat in a general war or in countering limited Communist aggression.

From its inception in 1946, the Tactical Air Command has devoted much of its energy toward advising and training Air National Guard and Air Force Reserve units. In coordination with the Continental Air Command, TAC has established training standards and provided advisory assistance for them and has conducted exercises and firepower demonstrations in which they have participated jointly with active TAC units. While this advisory relationship between TAC and its M-Day units has been of some value, it has lacked the close-knit coordination and split-second timing so essential for complementary forces today.

I do not mean to imply that the Continental Air Command has been in any way remiss in carrying out its supervisory responsibility in the past. On the contrary, CONAC has done an admirable job in overseeing the program. However, with the heavy reliance on air reserve forces, the highest state of combat readiness possible must be achieved. This goal can be reached most effectively by placing the responsibility for training and inspection with wartime gaining commands.

Since Tactical Air Command is already organized and staffed to control like units of the regular establishment, this air reserve forces function will be integrated within our present structure with a minimum of change. To ensure proper command emphasis and control, a focal point for reserve forces activities will be established at top management level in Headquarters TAC. At each numbered Air Force headquarters, a senior officer will be appointed as Adviser to the Commander on Reserve Affairs for continuity at the direct-contact level.

With the transfer of two tactical fighter wings from Ninth to Twelfth Air Force on July 1, 1960, TAC's two major numbered Air Forces were organized functionally to absorb the training responsibility. By that date Ninth Air Force commanded all troop carrier, reconnaissance, tanker, refueling, communications, delivery, and missile training units, and Twelfth Air Force became responsible for all tactical fighter and combat crew training units.

Following this pattern of homogeneity, air reserve troop carrier wings and Air National Guard tactical reconnaissance wings and tactical control and warning groups were placed under the training jurisdiction

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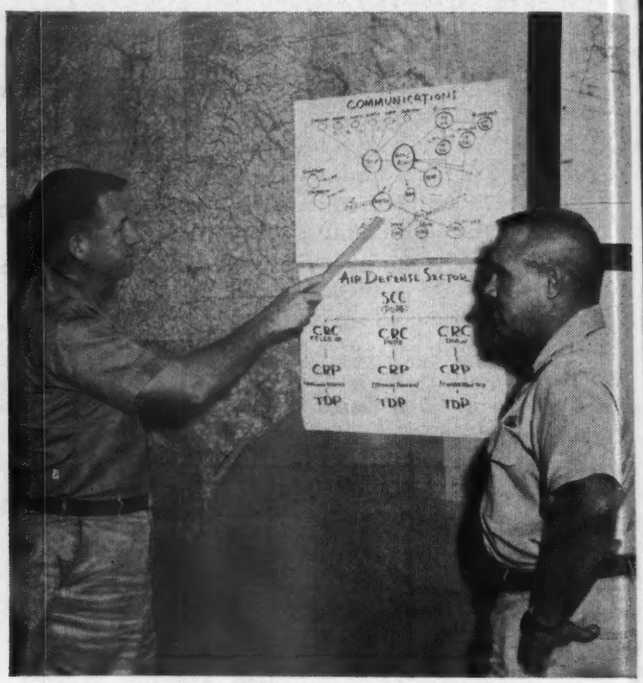
In Exercise Dark Cloud/Pine Cone II, Air Reserve troop carrier elements flew TAC-type missions. Here Army airborne troops move aboard reserve Fairchild C-119 Flying Boxcars for transportation to "battle area" drop zone.



Brig. Gen. Donald J. Strait, Commander, ANG Tactical Air Force and 108th Tactical Fighter Wing, New Jersey ANG, as well as vice chairman of AFA's ANG Council, briefs USAF Col. Charles W. Boedeker during exercise.

of Ninth Air Force, and the Air National Guard tactical fighter wings under Twelfth Air Force. In this way each Air Force will be able to concentrate on specific areas to the benefit of the over-all program.

Certainly one of the most important aspects of this transfer of responsibility for air reserve forces is the inspection function. As now planned, teams from Headquarters TAC will conduct operational readiness inspections (ORI) of each tactical Air Force Reserve and Air National Guard unit at least once every other year.

In addition, inspection teams from numbered Air Force headquarters will carry out general inspections in alternate years. These teams will apply the same inspection criteria as are presently being used for our Regular units. Through this comprehensive inspection program, we hope to ensure that our air reserve forces are meeting their training standards and in general are maintaining a degree of readiness required of them in our war plans.

I do not envision any immediate major change in operational programs for tactical air reserve forces. As part of their normal training requirement, we will continue to utilize these forces whenever possible to meet operational commitments placed on this command, such as productive military airlift, exercises, and firepower demonstrations. Unquestionably this is the most realistic and economical training they can receive.

The transfer of responsibility for air reserve forces training and inspection should go a long way toward bringing them in line with our regular forces, but this in itself is not enough. There must be a continuing review of the short- and long-range objectives of these forces with consideration to the over-all number of units required and the proper ratio by types of units. This analysis should be meshed with our Regular Air Force future programming and the force requirements dictated by our national strategy.

Increased operational capability will also require modernization of a number of Reserve and Guard units. The historic practice of equipping them with second-line aircraft has already been changed with the recent assignment of F-104s to the Air National Guard. Additional conversions should follow as late-model aircraft become available. If air reserve forces units are to maintain their effectiveness in the years ahead, there must be a continuing program of selective modernization of their aircraft and support equipment.

Finally, we must find ways to increase even further the professional qualifications and readiness of these forces. As a minimum, we should provide them with more training hours and training resources, long-range overwater flights, and other missions and exercises to prepare them for their wartime assignments.

Obviously, this would mean a substantial increase in funding. However, I firmly believe that these actions are economically sound in that they will provide a more effective reserve force and consequently a greater measure of security for our nation.—END

General Everest has been Commander, Tactical Air Command, since August 1, 1959. He served previously as Commander in Chief, USAFE; DCS/Operations, Hq. USAF; Director of the Joint Staff, Office of the Joint Chiefs of Staff. He commanded the Fifth Air Force in Korea. During World War II, General Everest flew and commanded heavy bombers in the Pacific. He graduated from the US Military Academy.

NEW ACCENT ON THE AIR RESERVE FORCES

Air National Guard units already play an important part in the air defense of the nation. From now on, the Air Defense Command will closely supervise Guard training and inspection. The goal will be tangible toughening of America's air defenses through . . .

MISSION: Teamwork

Lt. Gen. Joseph H. Atkinson, USAF
COMMANDER, AIR DEFENSE COMMAND

THE Air National Guard units assigned to the Air Defense Command (ADC) are a very important element in our air defense structure. This has been true, of course, for quite some time, and on more than one occasion these units have demonstrated their capabilities. I am sure we all remember the fine performance of the Air National Guard in our weapons meets.

I now foresee an improved air defense posture as a result of the forthcoming transfer of responsibilities for supervision of training and inspection. We have approximately forty Air National Guard squadrons assigned to Air Defense Command. In the past they have been trained and inspected by Continental Air Command for duty as air defense units, and CONAC did a fine job. We have no quarrel with that. Channels of communications, however, placed these units far away from Air Defense Command so far as training was concerned. This was disadvantageous.

Under the new system, training directives and manuals will be distributed through Air Defense Command air divisions to the using units following coordination with the National Guard Bureau. These directives will be identical to those used daily by squadrons of the regular establishment. The training program will continue to be under the direction of the state Adjutants General, but now in accordance with Air Defense Command manuals.

At this point, there are no Air Force Reserve units assigned as such to ADC. There are, however, individual reservists whose M-Day assignments are with ADC.

There will be approximately 130 officers and airmen assigned by us to the Guard units as technical advisers, who will monitor the program and will supervise all elements of training. These will be Air Defense Command personnel—a direct contact between Air Defense Command and elements on the line. This close tie should bring tangible results that will soon be recognized.

Full-time technicians employed by the individual states will perform maintenance and other technical duties to keep the organizations operational and will help conduct training.

Training will be conducted daily on a continuing basis. The Air Guard units will participate in air defense exercises alongside Regular Air Force units. They will be an integral part of the team at all times, and it is this teamwork that will pay off when the chips are down.

Inspection of the Guard units will be identical to that of the Regular Air Force units. There will be ORIs (operational readiness inspections), and the stops will be pulled for the National Guard just the same as they are for the regular squadrons. The fact that the augmentation force is manned by part-time military personnel will not and should not make any difference. I know that is the way the Air Guard people want it, too.

When the enemy is up there, he will make no allowances for part-time or full-time opponents. They will all be fair game to him. When the reports arrive at Headquarters ADC, they will tell the story of suc-

(Continued on following page)

Two South Carolina Air National Guardsmen on the flight line against the background of their new pride and joy, an F-104—part of the inventory of the snappy fighter that has recently been assigned to the Guard to increase its deterrence contribution.

A Guard crew stands alert, just one of the many across the country adding to air defense strength. Many ANG units are located in areas where there are no regular air defense units. ANG helps fill what might be a great gap in the picket fence.

cess or failure in the inspection. If there are failures, steps will be taken to correct them. In any case, we will know just where we stand, what our capabilities are, and what chances the enemy might have to reach his target.

The mission of the Air Defense Command in essence is to organize, train, equip, and support air defense forces for the North American Air Defense Command. To fulfill this obligation Air Defense Command—the major component of NORAD—has responsibilities stretching from the Mexican border to the northernmost reaches of Canada and beyond the shores of the Atlantic and Pacific Oceans. It calls for surveillance of more than a hundred million cubic miles of airspace. This demands tens of thousands of men and billions of dollars in equipment. The contribution of the Air National Guard to this effort is significant.

Currently we have nineteen Air National Guard squadrons standing alert throughout the country. Six of these are on twenty-four-hour alert, and thirteen are on fourteen-hour (or dawn-to-dusk) alert.

Many of these squadrons are located in areas where we have no Regular Air Force air defense units. Thus they cover what would otherwise be great gaps in our picket fence.

We realize, too, that a considerable percentage of the officers and noncommissioned officers in the Air National Guard saw service in World War II or Korea or both. This high experience level is also a valuable factor.

Because the Air National Guard is an important part of our deterrent force, it is my personal wish that every Guardsman will participate fully in the new training program to the mutual benefit of the Air National Guard and the Air Defense Command.—END

General Atkinson has headed the Air Defense Command since September 1956. Prior to that, he served as Commander in Chief of the joint Alaskan Command and Commander of the Second Air Force, Barksdale AFB, La. General Atkinson served in bombers in Europe and Africa during the second World War. He was Deputy Commander of the Italy-based Fifteenth Air Force during the latter days of the war.

The Military Air Transport Service anticipates increasingly greater reliance on the Guard and Reserve for dependable backup in the global strategic airlift mission. The command expects combat-ready reserves to play a major role in providing . . .

AIRLIFT for D-Day

Lt. Gen. William H. Tunner, USAF (Ret.)
FORMER COMMANDER
MILITARY AIR TRANSPORT SERVICE

IN MID-January 1960, the first of forty-seven Boeing C-97 Stratofreighters was transferred from the strategic airlift force of the Military Air Transport Service (MATS) to the Air National Guard. Within a short time, two ANG wings—six squadrons—had been equipped with C-97s, and the Guard had gone global.

The speed and skill with which Air National Guard aircrews and maintenance technicians made the sudden transition from fighters to those heavy, four-engine strategic airlift aircraft were extremely gratifying.

While the Guard squadrons were beginning transition to the C-97s, MATS, in conjunction with the elite Strategic Army Corps of the US Continental Army Command, conducted a mass strategic airlift exercise—Big Slam/Puerto Pine—in late March. During this airlift of STRAC forces and their combat equipment to Puerto Rico, a Marine Corps quick-erect fuel system was set up at Roosevelt Roads Naval Station, Puerto Rico. The 50,000-gallon system was fed directly from the base central storage facility by one and a half miles of flexible pipe.

More than 500 aircraft were serviced with 3,000,000 gallons of avgas by this system during the fifteen-day span of the operation. This unit is easily air transportable, requires a minimum of support, is expandable up to several hundred thousand gallons, and dispenses any type of fuel.

My personal experience convinces me that in any future airlift operation, whether test or actual emergency, if the requirement for fueling should be inland rather than coastal, air tankers could well be the source of supply.

It is unlikely that, in a nonexercise situation, a base central storage facility would be available.

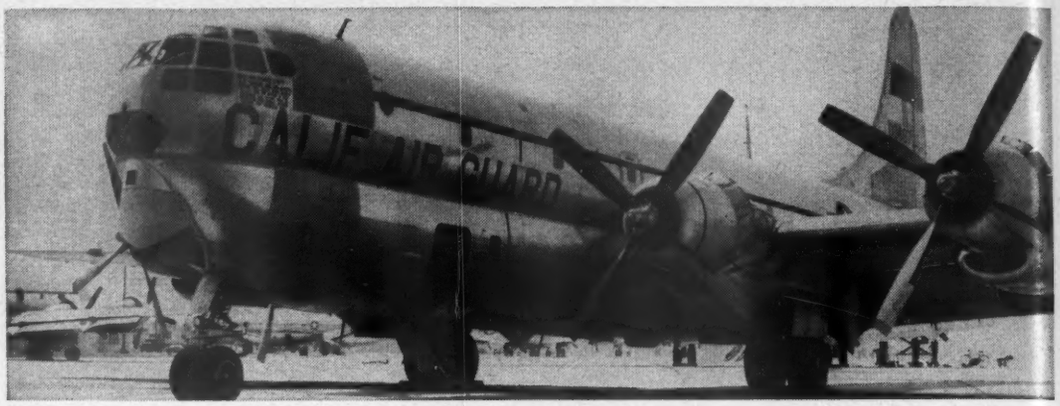
This naturally leads to the concept of using such a refueling system in forward combat zones, with POL (petroleum, oil, and lubricants) resupply accomplished by air. By this means, flexibility of air operations as well as mobility of the ground forces would be greatly enhanced.

Equating this Big Slam/Puerto Pine lesson with the splendid training record of the Air National Guard in the C-97, MATS and USCONARC agreed in a joint report:

"As tanker aircraft become excess to the requirements of the Air Force, they should be assigned to the ANG/Reserve and attached to MATS to

(Continued on following page)

Left, Maj. Gen. Joe W. Kelly, Jr., who succeeded General Tunner as MATS Commander on May 31. He served previously as the Commander of the Air Proving Ground Center, Eglin AFB, Fla., and as Director of Legislative Liaison in the Office of the Secretary of the Air Force. A West Point graduate, General Kelly served in Europe in World War II and headed the FEAF Bomber Command in Korea.



Right, a California ANG C-97. First of forty-seven of the Boeing transports was transferred from MATS to ANG early this year. Speed with which Guard completed the transition to these planes was extremely gratifying to all.

augment the airlift force and perform this petroleum transport mission."

It should be made very clear that there is much to be gained by having MATS place more and more reliance upon the air reserve forces for dependable backup in the global strategic airlift mission. Such a course would place a part of the augmentation airlift MATS must have for war or emergency operations under positive military control and discipline, assuring unquestioned airlift augmentation response under any emergency condition.

I also envision increasingly greater reliance by MATS upon the Guard and Reserve through reorganization of their air units, and transfer of cargo and tanker aircraft suitable for airlift operations as they phase out of the active Air Force inventory.

The new USAF reserve forces plan, whereby gaining commands will supervise the training and inspection of Air Force Reserve and Air National Guard units, is therefore of great interest. A total of 144 units have MATS D-Day assignments, fifty-eight from the Air Force Reserve and eighty-six from the Air National Guard.

These include mobile communications and AACS squadrons, air terminal squadrons, aeromedical transport squadrons, casualty staging units, aeromedical evacuation units, air rescue squadrons, air weather flights, and, of course, the two wings and six squadrons of strategic airlift C-97s. All told, 18,765 specialists of many types—from communicators to flight nurses, GCA operators to airlift pilots—are included in these units, all ready to join the strategic airlift force team in the event of war.

Concern with their training must be a good deal more than academic, and the new management plan was received with enthusiasm by me as Commander of MATS at the time.

The Continental Air Command has done a superb job of training today's reserve forces in their formative years since Korea. But in this age of increasing military specialization, reserve forces units now quite properly will be trained by the command with the responsibility for their wartime employment.

The compressed-time character of modern warfare demands that the reserve forces be thoroughly trained *before* they are called up to join the active organization, and places a premium on training realism.

The assigned reserve forces should be made a part of MATS essential war-readiness training, using them to the maximum possible extent in global air logistics operations by which we keep the strategic airlift force ready for any emergency. Also they should be used to the maximum in future mass airlift exercises, such as Big Slam/Puerto Pine.

In addition to this intensive utilization of units already assigned, there is a strong need for additional Air Reserve and Air National Guard squadrons trained for the global strategic airlift mission. Training of these squadrons—dependable and sure in their response for war airlift augmentation, wearing the same uniform, speaking the same language, and motivated by the same considerations of national security—would provide a major asset to the Air Force and the national strategic airlift capability.

I am in full agreement with the subcommittee of the United States House of Representatives which recently declared after an airlift study:

> "The subcommittee recommends that, in addition to the six C-97 squadrons which have been established within the Air National Guard, that such additional C-97 units as may be militarily justifiable be established in either the Air National Guard or the Air Force Reserve; that additional KC-97s in their aerial tanker configuration in such number as may be justified by military considerations, be transferred to the Air National Guard or the Air Force Reserve, in order to establish a POL resupply capability in accordance with the lessons learned in the Big Slam/Puerto Pine exercise; that as C-124s become excess to the active inventory they be transferred, in accordance with the requirements then existing, to the Air National Guard or the Air Force Reserve."

In short, I feel very keenly the potentialities and capabilities of the air reserve forces and I am pleased they will be utilized in the execution of the MATS mission.—END

General Tunner, who retired on May 31, is one of the world's top authorities on airlift. He commanded the World War II "Hump" airlift over the Himalayas, the 1948-49 Berlin Airlift, and the Korean Airlift. He served as DCS/Operations, Hq. USAF; USAFE Commander in Chief; and Deputy Commander, AMC, prior to assuming command of MATS in 1958. With his retirement, General Tunner completed thirty-two years of commissioned service.

NEW ACCENT ON THE AIR RESERVE FORCES

USAF's reserve forces possess great capabilities and potentialities in the field of airlift. Increased use of reserves in this area might spell the end of a controversial program to utilize civil airliners as military transports. The reserve forces could, thus, prove the . . .

KEY TO THE AIRLIFT PROBLEM

CONTINUED conversion of Air Force Reserve and Air National Guard units to fill military airlift requirements, leading to eventual abandonment of the Civil Reserve Air Fleet (CRAF) program, has been recommended by a committee of the Air Force Association's Air National Guard Council.

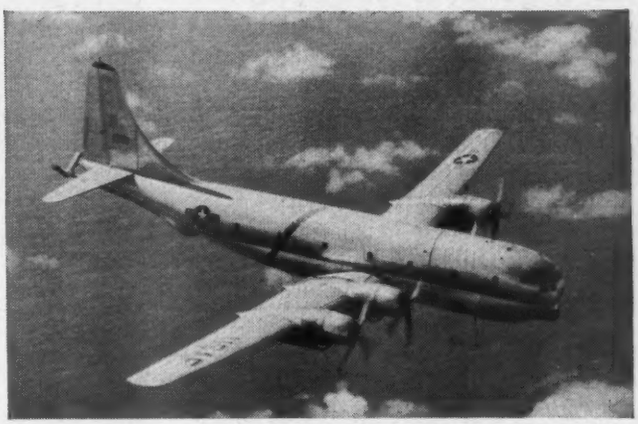
In recent testimony before a subcommittee of the House Armed Services Committee, President Howard T. Markey said AFA is "convinced that expansion of the Air Reserve and the Air National Guard in the field of strategic transport, to augment MATS, is the most realistic and logical way to provide a posture of immediate airlift readiness and strength. The continued development of this concept, in our opinion, is most important."

Citing the AFA committee study, which has been circulated to Congress, the Defense Department, and USAF, Markey said that the buildup of airlift capability, both regular and reserve, will permit a cut in the nation's dependence on civil carriers. He suggested that airline resources then could be turned more effectively to other programs such as the War Air Service Pattern (WASP) and to support of civil defense.

"We are convinced," he said, "that this procedure is far more realistic than any endeavor to predicate military airlift reliance upon skills, equipment, and know-how which by tradition are keyed in training, design, and experience to commercial operations only."

As indicated by General Tunner, retired MATS Commander, on page 115, his headquarters was favorably impressed by the speed and skill with which six Air National Guard squadrons have made the shift from fighter aircraft to heavy transports with the first transfer of C-97s phased out of MATS.

Under the Guard, these aircraft will provide a backup manned by personnel in uniform and fully subject to military discipline. To some extent they will lessen the dependence of CRAF, provide more cargo capability in case of war, and provide a reliable source of airlift in limited emergencies. Both the KC-97, with its tanker capacity removed, and the C-124, which MATS expects to replace in the future, can be used by reserve forces.



AFA recommends that KC-97, above, being replaced by jet-powered KC-135, be assigned to reserve forces with the mission of delivering ground fuels to remote locations.

In addition, it was suggested by the AFA committee that some Air National Guard units be given KC-97s to train for a midair refueling mission to support ANG fighters with this capability. It has been pointed out that tankers also can be used, as General Tunner suggests, to transport fuel to remote points.

The placing of more reliance on reserve forces for airlift backup can help overcome problems peculiar to the existing CRAF setup. For all the effort by MATS and the airlines, there still is no guarantee that the CRAF response will be positive and immediate in case of a national emergency. The AFA report says more

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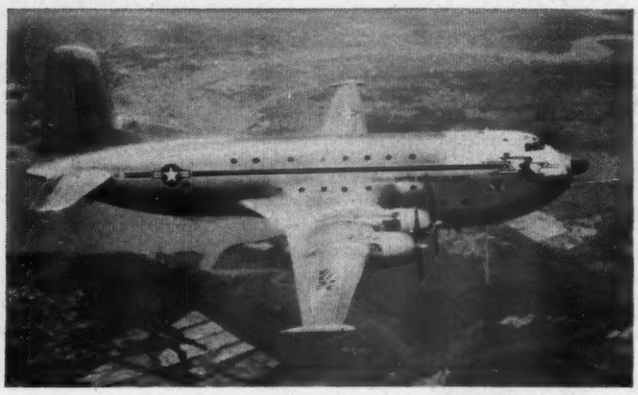
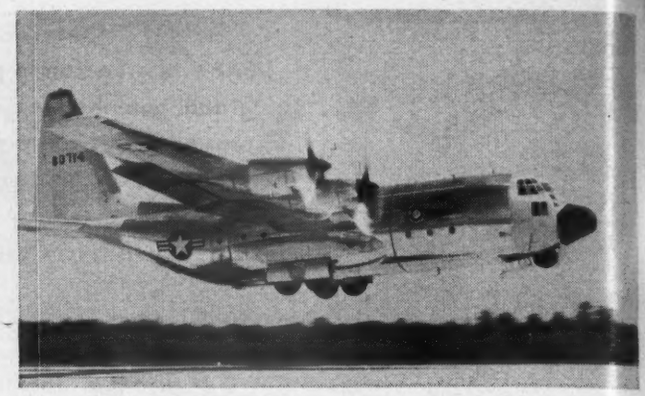




MATS C-124 Globemaster, left, and C-130 Hercules. AFA recommends that, as they become available, they be assigned to air reserve units. Association also has called for additional KC-97s to be converted to cargo configuration for use by Air National Guard units. Placing of increased reliance on reserves would solve many vexatious military airlift problems.

than $37 million has been spent on the CRAF program. At the same time, it is impossible to guarantee the fleet will be available by means of contracts with the airlines.

There is strong sentiment in the military that only legislation can make CRAF practical. The law would have to give USAF the authority to take over planes, supplies, equipment, and facilities. It would have to leave no doubt that, in event of war, both air and ground crews as well as support personnel would be under complete military control. Without such legislation, it is felt that CRAF planes and people cannot be used except in safe and quiet areas, where there is no danger of combat activity.

Even with such legislation it is obvious that the CRAF fleet will be of no use in any operation, whether a war or a maneuver, where action must be taken without notice and in secrecy.

The AFA committee made it clear that it does not consider CRAF a worthless program or that the airlines are not part of the defense posture. It did say it does not consider the airlines a "reserve" force in the military definition of that word and that they can do a more effective job if their mission is in support of the civil defense effort.

AFA's Cooper Committee. Col. Roy E. Cooper, Commander, 153d Fighter Group, Wyoming ANG; AFA Administrative Director John Gray; Lt. Dale Hendry, 124th Fighter Group, Idaho ANG; Lt. Col. R. P. Knight, 133d AD Wing, Minnesota ANG. Committee conducted study of airlift problems.

Incorporated in the AFA committee report is a statement on the reserve program by Stuart G. Tipton, president of the Air Transport Association. ATA is an organization of the airlines that has taken an active part in the fight, most of it on Capitol Hill, against MATS. Mr. Tipton takes the view that both Air Reserve and Air National Guard airlift efforts would be confined to what is called "hard core" wartime transportation. He concludes from this that Reserve and Guard capability can be used to cut down on the size of MATS, which is the basic aim of ATA's legislative and publicity effort.

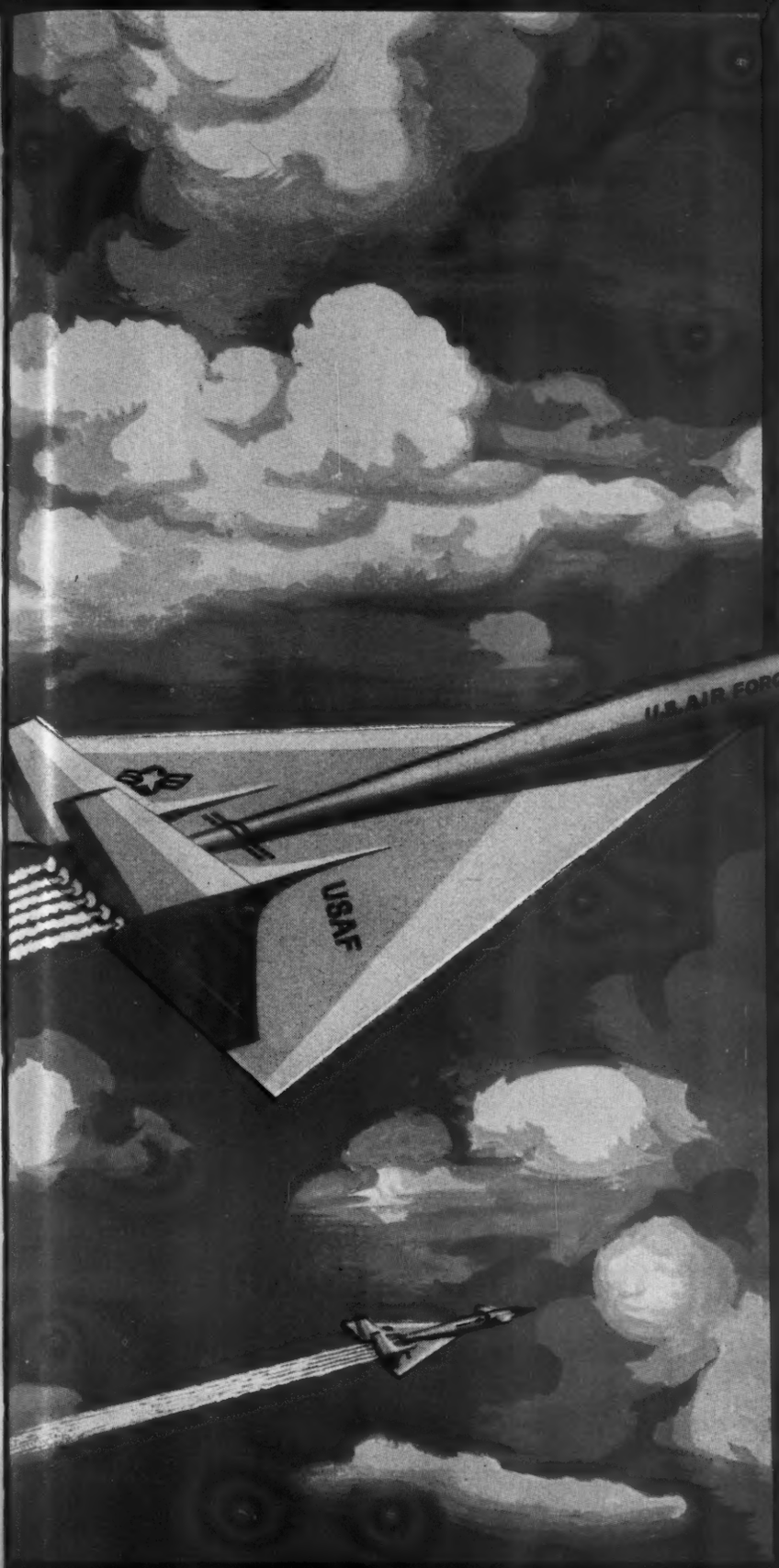
AFA's committee does not agree with ATA in this conclusion, arguing that the ATA contention is not supported by the military requirement for airlift. The AFA committee, however, calls for an increased effort to resolve the differences between ATA and MATS. Further, it suggests that AFA make a definitive study of airlift requirements for domestic emergency relief after an enemy attack on the United States. This subject was not mentioned in Mr. Tipton's comments on the Reserve and Guard program.

In its report, the AFA group said it "became painfully aware of the sensitive nature of the whole post-strike disaster relief planning, or lack thereof, in our federal government." The report asserted there are two areas involved: the military problem, viewed as an in-house matter by the Defense Department, and the civilian problem that is concerned with relief for all citizens and survival of the nation.

The committee did not recommend that the reserve forces be designated to carry out a civil relief mission as a job secondary to their assignment for MATS in wartime. It declared that the airlift needed for civil defense postattack recovery is an additional requirement.

"It is apparent," the report said, "that the Office of Civil and Defense Mobilization does not have airlift units immediately available to handle a nuclear attack recovery in the United States."

—CLAUDE WITZE



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The prototype of the future for military and commercial aircraft, North American Aviation's B-70 *Valkyrie*, will include major structural components from Avco's Nashville Division.

Production of high strength-to-weight structures is a specialty of the Nashville Division. For that reason, Avco/Nashville was one of the companies selected to produce panels for a section of the B-70 fuselage. *Avcomb* panels of stainless steel honeycomb are exceptionally strong, yet light, and offer high resistance to heat. These tough panels are produced by a new process called *Avcoramic* tooling, designed to make better quality panels at lower cost.

Avco/Nashville's work also includes components for the new Convair 880 and 600 jet transports and for the Lockheed *Hercules* military transport. Nashville offers breadth and depth of experience in designing, engineering and producing all types of lightweight honeycomb structures, including aluminum, titanium, and fibre glass for aircraft, missiles, space vehicles, and radar reflectors.

New tooling processes for stainless steel honeycomb panels, together with Nashville's broad experience gained over many years, afford its customers a unique combination of quality and skill. Why not put this experience to work on your structural problems? *For more information write: General Marketing Manager—Structures, Nashville Division, Avco Corporation, Nashville 1, Tennessee.*

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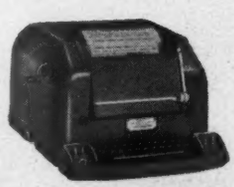

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AFA NEWS

SQUADRON OF THE MONTH

Pasadena, Calif., Area Squadron Cited for effectively designed programming, which focused community attention on the past, present, and future contributions of airmen all over the world.

Pasadena Squadron had an unusual full house, seven aces, on April 21. Top Air Force and Navy flyers in World War II and Korea turned out to honor **Thomas G. Lanphier, Jr.,** himself a World War II ace.

Mr. Lanphier, who has been campaigning across the country for a stepped-up defense effort, spoke to the Squadron. He was, it will be recalled, second President of the Air Force Association and is a current Board member. He left his post as a Convair vice president early this year to carry on his defense crusade.

During the second World War, Mr. Lanphier was a P-38 pilot credited with shooting down six enemy planes, including the transport carrying **Japanese Admiral Yamamoto**—a feat for which he received the Navy Cross.

Among guests at the Squadron dinner, in addition to the covey of aces, was **Maxwell Stiles** of the Los Angeles *Mirror-News,* who was Lockheed's P-38 publicity manager at the time Lanphier made his biggest kill. Stiles said he wrote the best story of his public information career, then couldn't get it cleared for release.

Another guest was **Mr. Takaeichi Goto,** wartime commander of the Japanese Imperial Navy's 24th Fighter Squadron. Mr. Goto is now a professor in engineering at Cal Tech. He is a US citizen, has a son in the US Army.

Bob Brooks planned and chaired the program.

Air Explorer Troop 51, Boy Scouts of America, sponsored by the Pasadena Squadron, performed the flag ceremony opening the evening. **Bob Crane,** Columbia Broadcasting System newscaster, served as toastmaster.

(Continued on following page)

Aces high. Present at dinner in Pasadena honoring Tom Lanphier were Navy ace Cmdr. C. E. Harris, Lanphier, Cmdr. E. A. Valencia, WW II USAF Lt. J. L. Brooks, Lt. Col. C. E. Anderson, wartime USAF aces J. R. Alison, W. M. Mahurin. Lanphier gave address.

At Utah Convention. Past Wing Commanders George van Leeowen, Dale Erickson, Paul Fisher at rear; Joseph Jacobs, Reece Robinson, William Farmer, Rex Carlisle in front row. Jacobs was elected again this year to head the Utah Wing.

Retiring Utah Wing Commander William Farmer and AFA National President Howard Markey at Utah gathering. The Association President delivered the major address at the wing-ding, two-day event given by dynamic Utah folks at Hotel Newhouse, Salt Lake City.

Third Chicagoland Aerospace Seminar. Left to right, AFA President Markey, Harold Neal of Cook Electric Co., Charles Miesse, American Rocket Society, Wing's Harold Carson.

New York Conventioneers Mr. and Mrs. Jim Lynett, Mr. and Mrs. Bud West, Wing Commander Fred Monsees, Mr. and Mrs. Gordon Thiel, Mr. and Mrs. Curt Irwin at banquet.

Philip Schwartz, Squadron Commander, and other officers and members deserve a hand for another fine program.

Utah Wing's 1960 Convention was the wing-ding, two-day event one might have expected. It was held at the Hotel Newhouse, Salt Lake City, on May 13 and 14.

Major event was the awards luncheon on May 14. **AFA President Howard T. Markey** delivered the principal address. Retiring Commander **Bill Farmer** presented the Wing's annual achievement awards to several members who have distinguished themselves in AFA work. The convention program also included a golf tournament, a bowling match, "Reno Night," attendance at a wrestling watch, a ladies' fashion show, and an old-time Western barbecue.

There was, with all of this, time to hold normal business sessions and elect new officers. **Joseph C. Jacobs** was elected Commander. He served once previously as Commander, but his term was cut short on that occasion when he moved to Hawaii. Present for the voting were all former Utah Wing Commanders.

Retiring Commander Farmer, who has served as National Convention Parliamentarian for the past several years, was in charge of this year's Wing meeting. Regional Vice President Dale R. Erickson was in charge of installing the new officers.

It was a dynamic and well staged convention, particularly coming on the heels of the Wing's highly successful Aerospace Education Conference, at which more than four hundred persons attended and heard thirty speakers. These Utah folk are real energetic!

The **New York Wing** held its **1960 Wing Convention** at Mitchel AFB, with the Mitchel AFA Squadron acting as host. **Fred Monsees** was re-elected Commander; **Arthur Wegman,** Vice Commander; **Bob Seiloff,** Treasurer; and **Bob Kestler,** Corresponding Secretary.

Gordon Thiel of Syracuse was chosen Vice Commander for the upstate area, and **Irene Keith,** Queens Squadron, was selected as Recording Secretary. **Jim Lynett,** a past Wing Commander, serves as Organization Director of the Wing.

Feature event of the program was a banquet at which the guest speaker was **C. R. Smith,** President of American Airlines, former National President of AFA, and also a member of the Board. He discussed airline problems in moving into jets.

Among honored guests at the banquet were **Julian B. Rosenthal** of New York, Chairman of the Board of Directors; **Chester A. Richardson,** Pittsburgh, Regional Vice President; and Board members **Robert S. Johnson, Paul S. Zuckerman,** and **Roger J. Browne.**

The third **Chicagoland Aerospace Seminar** took place last month at the Conrad-Hilton Hotel under the direction of **Harold G. "Kit" Carson,** Illinois Wing Commander. **President**

(Continued on page 125)

California Wing holds annual Design and Model Contest. Here Wing's Carl C. Alford, director of the contest, poses with ten boy and girl winners of West Coast competition.

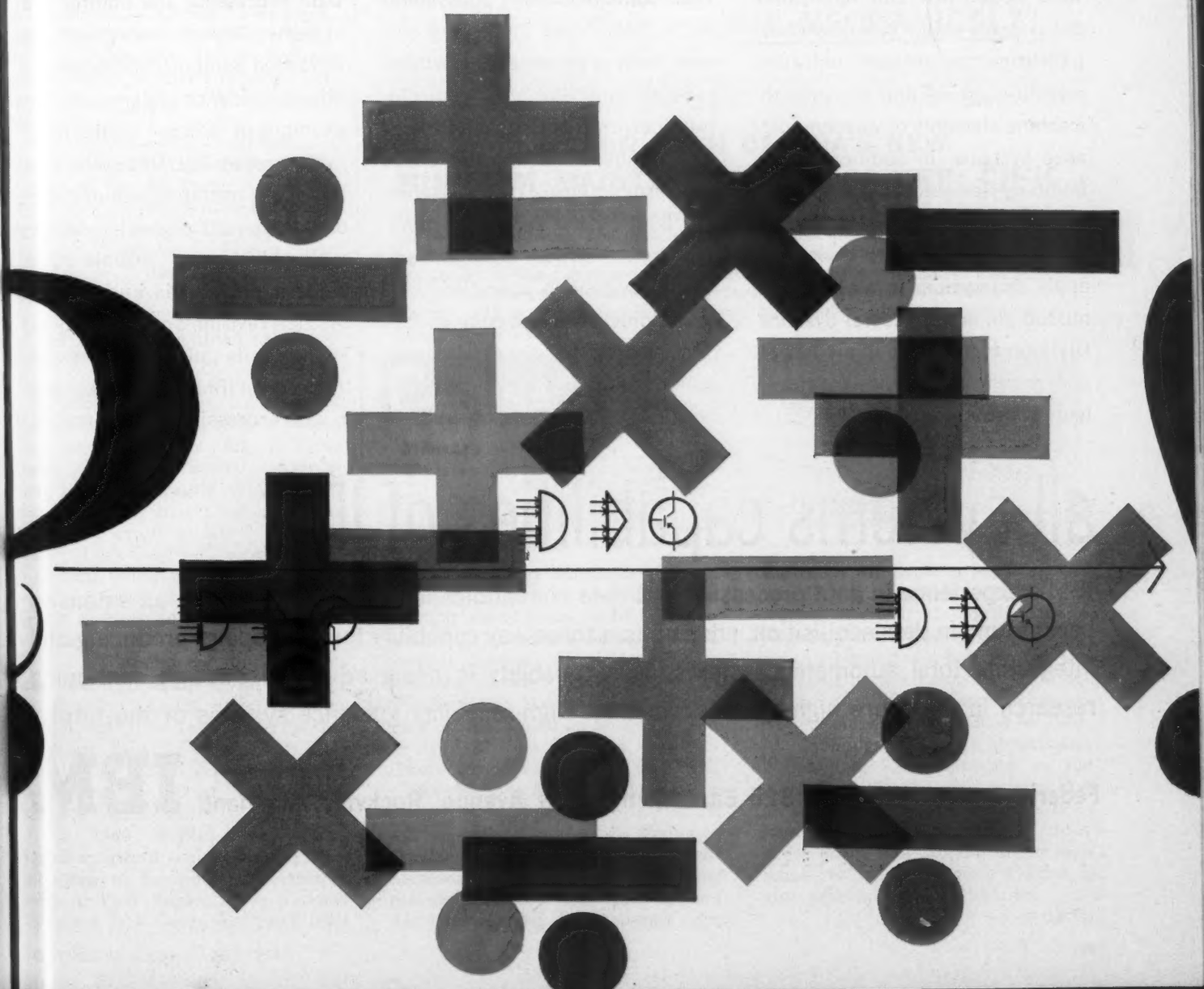
California Commander John Beringer, left, and his wife, who is new Auxiliary President, look across Explorer satellite at past office holders Bill Gilson, Merle Henderson.

COMPUTENCE

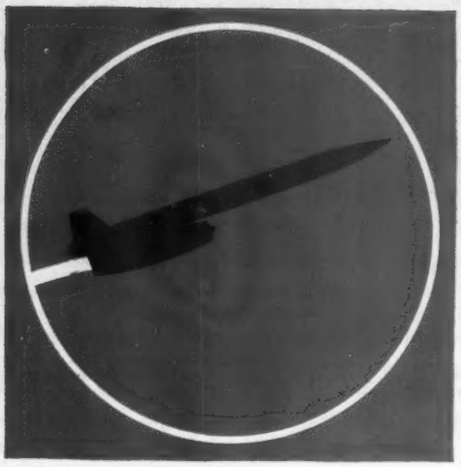
total competence in computation and data processing—the breadth, the brains, and the background

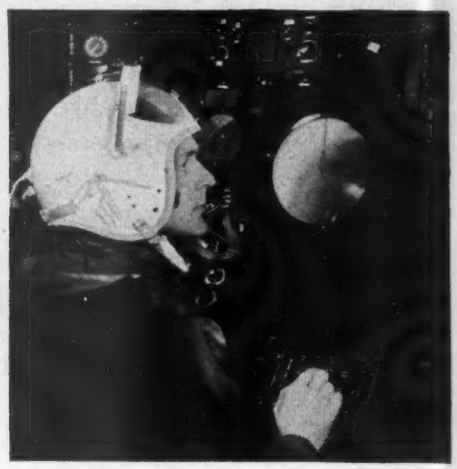
The term: the essence of Burroughs Corporation, expanding the meaning of computation to new and unique dimensions for the contract team program and airborne, space, surface and underwater systems. **Its breadth:** total competence, ranging from basic research through production to the broadest field service support. **Its background:** total competence, from 75 years devoted to computation and data processing; from membership on the Polaris and Atlas teams, system-management of the ALRI team. **Its brain-children:** current crop includes the Atlas guidance computers, high-speed data processing for Polaris and miniaturized airborne computers for ALRI. **The point of purpose:** "Computence"—total competence in computation and data processing, closing in on a problem with an intensity and range all its own.

Burroughs Corporation Burroughs *"NEW DIMENSIONS / in computation for military systems"*



The elements of guidance and control:





Data Acquisition and Application Subsystems—IBM has proven capabilities to provide real-time man-to-machine and machine-to-machine elements of weapon guidance systems. In addition to the Bombing-Navigation system with its visual displays in the B-52, IBM also provides interface devices to apply this system to air-launched missile guidance. Federal Systems Division experience in air-based and ground-based guidance systems is proven in operation.

Data Communications Subsystems—The SAGE data processing system, heart of America's air defense network, embodies advanced communications devices and techniques required to filter and direct an enormous flow of data. Designed and built by the Federal Systems Division, the AN/FSQ-7, an advanced system in operation, embodies processing and communications power to direct defense operations as well as to guide missiles from remote sites.

Data Processing and Control Subsystems—Now in development, the Advanced Bombing-Navigation and Missile Guidance system is another example of IBM's "closed-loop" system capability. This system satisfies the operating requirements of high-speed, long-range weapon systems. Compact, reliable equipment such as this and Federal Systems Division's computer for the Titan missile guidance system are the result of IBM's vast background in data processing and control.

all systems capabilities of IBM

IBM's experience in data processing and data communications, supplemented by an extensive background in data acquisition, adds up to a three-way capability for developing, producing and integrating total automated systems. This capability is being advanced through continuing research in miniature high-speed devices for high-reliability guidance systems of the future.

Federal Systems Division, 326 East Montgomery Avenue, Rockville, Maryland **IBM**

Markey was a featured guest during the program, which attracted more than four hundred area high school and college students, their teachers, and local industrialists.

Speakers included **Harold T. Neal,** Vice President of Cook Electric Co., **Charles C. Miesse,** President of the Chicago section of the American Rocket Society, and **Dr. Milton Goldstein,** Director of Research of the American Institute of Engineering and Technology.

AFA presented **five bronze plaques** to meritorious entrants at the **1960 National Science Fair** in Indianapolis, Ind., on May 14. The awards went to **Donald F. Carpenter** of William Hall High School, Hartford, Conn., in the field of Aerospace Dynamics; to **Larry R. Owen,** Nixa High School, Nixa, Mo., in the Aerospace Power category; to **James K. Bramblett,** Jefferson High School, Lafayette, Ind., in Electronics; to **Gerald G. Birdwell,** Eagle Lake High School, Eagle Lake, Tex., in Propulsion; and to **Barbara Jane Dymond,** Benton Township High School, Dalton, Pa., for her exhibit in Meteorology.

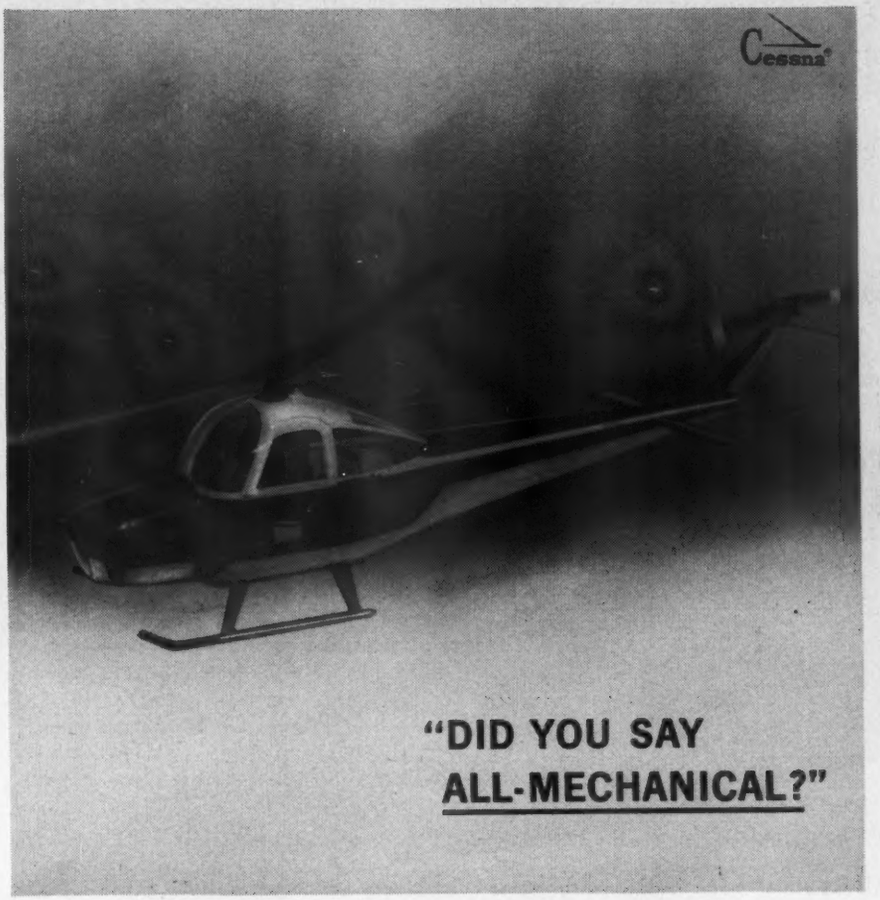
Seventeen-year-old Bramblett, a high school junior, was chosen to be a guest of the Air Force Association at the forthcoming National Convention in San Francisco. His project was entitled, "Ultraviolet Flying Spot Microscopy." The other exhibits ranged from the construction of a model lunar base by Larry Owen to an entry on ion propulsion from Gerald Birdwell.

CROSS COUNTRY . . . **President Markey** and **Don Strait** of New Jersey, Chairman of AFA's Air National Guard Council, delivered presentations before a hearing of **Congressman L. Mendel Rivers'** subcommittee on reserve affairs in late May. Both presentations were well received. . . . A surprise visitor to the office, as we were preparing this issue, was **Jim Lynett** of New York. He was escorting **Jim Jr.,** on a tour of the Capital City. . . . **Anchorage Squadron** reports that a current program featuring the showing of Air Force films in schools has thus far been attended by more than 1,750 students and teachers. . . . **Ohio Wing Convention** is set for July 10 at the Carousel Motel in Cincinnati.

The **1960 Mifflin County, Pa., Squadron award** for outstanding contributions to Squadron development went to **Paul Fegly.** . . . **National Treasurer Jack Gross,** just back from a two-week active-duty tour of bases in Europe, reports he was gratified to find that almost everyone he talked to praised AFA's efforts in the field of national defense. . . . **Mrs. Jimmy Doolittle,** honorary Commander of the **New York City WAF Squadron,** was a guest of the Squadron at a luncheon on April 27. She spoke on her experiences during a recent trip to Russia.

Mrs. Eleanor Arnold, widow of the beloved "Old Man" of World War II, will be present at the San Francisco Convention. . . . Dayton's **Wright Memorial AFA Squadron** is joining the ranks of AFA units that sponsor **Air Explorer Boy Scout troops.** The **charter for Air Explorer Scout Squadron 117** was submitted to BSA headquarters in April. . . . **Joe Hodges** of **Virginia,** Central East AFA Vice President, is busting vest buttons with the news that his son **Laury** has been appointed to the Air Force Academy. He will enter with the Class of 1964. . . . Similarly, **Dave McCallister,** Wilmington, Del., dropped in the other day with the glad tidings that his eldest daughter, **Cindee,** has been selected for a year's exchange study in Germany, only student in her high school to be so honored. Cindee is also a brand-new CAP Cadet.

—Gus Duda



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A Social Portrait

***The Professional Soldier: A Social and Political Portrait*, by Morris Janowitz (Free Press of Glencoe, Ill., 1960, 464 pages, $6.75)**

Reviewed by Col. G. O. Ashley, USAF

The Professional Soldier is about eighty percent fact and twenty percent hypotheses. It is uncommonly dull reading. Mr. Janowitz goes out of his way to define things. . . . "In broadest terms, the professional soldier can be defined as a person who has made the military establishment the locus of his career." . . . "Because of the formal structure of the military establishment, the military elite comprises the highest-ranking officers." Now you know.

Ostensibly, the book is addressed to three important questions. They are:

- Can the military succeed in adapting itself to continuous technological change?
- Can it redefine its strategy, doctrine, and self-conceptions so it can organize itself to meet its multiple functions of strategic deterrence, limited warfare, and enlarged political responsibility?
- Can it maintain an effective organization while participating in new schemes like nuclear test controls and regional security arrangements?

Mr. Janowitz doesn't really answer any of these questions, of course. Instead, he asks *other* questions, which do not get answered either.

Throughout the book, however, one thing stands out quite clearly. All you need to do to solve these weighty matters is to put social psychologists in charge.

Much of the book is a discussion of the relative worth and contribution of three generalized figures—the heroic leaders, the military managers, and the military engineers or technologists. There is little discussion about real professional *officers*, as that term needs to be used to make much sense out of the military forces of the nation. I got the definite impression that Mr. Janowitz would be uncomfortable around a real *officer*. Let's see if you agree.

In his own words . . . "The shift from domination to manipulation and persuasion involves the relative balance of negative sanctions versus positive incentives." . . . "In the cold war, once the immediate pressure of combat is removed, there is a tendency to slip back into older patterns of authoritarian discipline which are *no longer effective*." The italics are mine. In another . . . "old-fashioned repressive military discipline." This tone lasts throughout the book.

I say, about eighty percent of the book is fact. This gives it a disarming authenticity and simplicity. However, it is an old custom of social psychologists to take fact and *do* something with it. Mr. Janowitz will irritate a professional officer, for the basic premises of the social psychologist are dead set against the premises of the professional officer. Those officers who are on the fence won't see this. Those officers who are dedicated to making "managers" of themselves will applaud the book. Those officers who have become "technicians" won't read the book, of course.

Mr. Janowitz has accurately sensed the concern in public circles over the odd new "power in peacetime" that military matters have in our government today. He has documented accurately the military influence over politics, the economy, and many people's way of life. He has also described correctly the dilemma that faces some types of so-called officers, due in much part to a failure of civilians to give to their armed forces an adequate definition of its proper role in a protracted international conflict.

Therefore, this book will be quoted and talked about. It may be useful in this regard to remember that one of the large factors accounting for our present national muddle is that people have much too frequently accepted without question quite a few too many of the postulates of social psychology.

About the reviewer: *Col. G. O. Ashley is Chief, Cold War Plans Branch, DCS/Plans and Programs, Hq. USAF. During World War II, he was a combat engineer in the CBI theater, then G4 representative on the Hump as air freight control officer. He lectured for five years at the Air University on problem solving, group dynamics, and general semantics, was Air Force instructor at the USAREUR-NATO tactical atomic energy school, Oberammergau, Germany, and served as AF Inspector General for training and education. He is a frequent contributor to national publications.*

General Reference

The fall-winter 1959-60 edition of the *World Aviation Directory* (American Aviation Publications, $10 in US and Canada, $11 elsewhere), Volume 20, Number 2 of this standard work, lists companies, their affiliates, and officials. Concerns in the US, Canada, Europe, Central and South America, Africa, the Middle East, Australia, and Asia are included.

The 41st annual edition of *The Aerospace Yearbook*, edited by James J. Haggerty, Jr. (American Aviation Publications, $10), offers a complete guide to American aviation, civil and military. Extensive photo coverage of hardware supplements textual material on all facets of civil and military aerospace endeavor in this country.

The National Aviation Education Council recently released an illustrated reference book on American aerospace hardware entitled *1960 United States Aircraft, Missiles, and Spacecraft*. It is a complete and excellent reference work especially tailored to use in public and school libraries. Copies can be obtained from NAEC, 1025 Connecticut Avenue, N. W., Washington 6, D. C. Copies cost $1 each.

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A Tokyo publishing house, Kantosha, has announced publication of an illustrated reference to *German Military Aircraft in the Second World War*. It was compiled by the staff of the Japanese magazine *Airview*, and edited by Elichiro Sekigawa. It comes in a two-volume set. The first, in Japanese, contains photos and three-view drawings. The second, in English, is minus the illustrations. It includes Germany's early jets and missiles.

Technical Reference

Artificial Earth Satellites, Vols. 1 and 2, edited by L. V. Kurnosova (Plenum Press, $9.50). English translation of two-volume Russian report on the first three Soviet artificial satellites and the results gained from them.

Air Technical Dictionary: German-English, edited by H. L. Darcy and others (Duell, Sloan & Pearce, $10). An English translation of an exhaustive German work.

(Continued on following page)

Annual Review of Nuclear Science, edited by Emilio Segre, Leonard L. Schiff and others (National Research Council, $7). An edited collection of articles on nuclear physics, atomic energy, radio chemistry, fast reactors, other related topics.

Nuclear Radiation Engineering, by F. W. Hutchinson (Ronald Press, $6).

Nuclear Technology for Engineers, by Hobart R. Ellis (McGraw-Hill, $9.50). A technical introduction to the theory of nuclear technology in four parts: radio-tracers, irradiation technology, fission, and fusion.

Small Gas Turbines and Free Piston Engines, by A. W. Judge (Macmillan, $10). Discussion of gas turbines from 30 to 40 bhp to 1,500 bhp with emphasis on medium-range engines.

Advanced Propulsion Systems, edited by Morton Alperin and George P. Sutton (Pergamon Press, $6). The proceedings of the Advanced Propulsion Systems Symposium, Los Angeles, 1957, covering ion propulsion systems, direct power conversion, human hazards of spaceflight, electrostatic generators, and other topics.

The Aerodynamics of Powered Flight, by Robert L. Carroll (Wiley, $8.50). Introductory text for aeronautical engineering covering fluid dynamics, lift and drag, incompressible flow, compressibility of subsonic flow, shock-wave formation, supersonic flight, and propeller theory.

Foundations of Aerodynamics, by A. M. Keuthe and J. D. Schetzer (Wiley, $11.75). Second, revised edition, with new technical material added.

Aircraft Manual, 1960, by J. W. R. Taylor (Simmons-Boardman, $2.95). Guide to modern aircraft.

Observers' Book of Aircraft, by William Green and Gerald Pollinger (Frederick Warne, $1.25). New revised picture-statistical guide to the latest aircraft of all nations, including silhouettes for recognition.

Civil Air Regulations and Flight Standard for Pilots (Aero Publishers, $2.50). 22d edition, illustrated.

Civil Air Regulations and Reference for Mechanics (Aero Publishers, $2.50). 15th annual edition.

Fundamentals of Stress Analysis, by Albert Deyarmond and Albert Arslan (Aero Publishers, $5.75). Second edition, covering basic concepts of structural analysis, theory of types of beams, trusses, and columns.

Surface Effects on Spacecraft Materials, edited by Francis J. Claus (Wiley, $11.50). The proceedings of a USAF-Lockheed symposium on materials for temperature-control surfaces of spacecraft and the behavior of material surfaces in space.

The Other Side of the Moon, issued by the USSR Academy of Sciences, translated from Russian by J. B. Sykes (Pergamon Press, $2.50). The USSR study of its photos of the other side of the moon and how they were made.

Paperbacks

Command Decision by William W. Haines (Bantam, 35¢)—Reprint of this classic air novel of the ETO, World War II.

Rocket Manual for Amateurs by B. F. Brinley (Ballantine, 50¢)—Guidebook for modelmakers and rocket fans.

Space Weapons by the edito , of AIR FORCE/SPACE DIGEST (Praeger, $1.45)—Authentic, comprehensive report on USAF research, development, and progress in missiles, aerospace medicine, and spaceflight.

MIG Alley by Robert Eunson (Ace, 35¢)—An action-packed novel of the air war in Korea and the battle of the Sabre vs. the MIG-15.

Boeing 707 by Martin Caidin (Ballantine, 50¢)—A story of America's first all-jet commercial airliner in photo and narrative. Highly descriptive account of 707 operations by US commercial air carriers.

Air Force by Frank Harvey (Ballantine, 35¢)—Collections of eight Harvey stories about the AF, previously published in *Saturday Evening Post, Argosy,* and *Cavalier.*

Space Handbook: Astronautics and Its Applications by Robert Buchheim and the staff of RAND Corporation (Random House, $1.25)—A report on the state of American missilry and space technology written for the House Committee on Astronautics and Space.

Space Primer: An Introduction to Astronautics by Convair Division of General Dynamics—Illustrated booklet on the basic principles of missiles, satellites, and spaceflight. Free from Convair Astronautics, P. O. Box 1128, San Diego, 12, Calif.

The Rainbow and the Rose by Nevil Shute (New American Library, 50¢)—Air novel centered about the career of an airman of fortune who pursues his calling as a military flyer and as a civilian airline pilot.

Of Stars and Men by Harlow Shapley (Pocket Books, 50¢)—Harvard astronomer discusses the origin and composition of the universe, life on other planets.

Voyages to the Moon by Marjorie Hope Nicolson (Macmillan, $1.75)—A history of cosmic voyages in literature from Lucian to C. S. Lewis.

X-15: Man's First Flight into Space by Martin Caidin (Rutledge Press, 25¢)—A simplified picture story of the X-15 and our high-speed experimental test program.

All About Missiles and Satellites by David Mark (Cowan, $1.50)—Features thirty-eight major missiles, discussing maintenance, flight control, launch, tracking testing, payload, and achievements made in this field.

The Other Side of the Sky by Arthur C. Clarke (New American Library, 35¢)—A collection of Clarke science fiction.

Space, Time and Gravitation: An Outline of the General Relativity Theory by Sir Arthur S. Eddington (Harper, $1.35).

The Inhabited Universe by Kenneth W. Gatland and Derek D. Dempster (Premier, 50¢)—An excellent discussion of the universe and possibilities of life on other planets and stars.

The Wooden Horse by Eric Williams (Berkley, 35¢)—The famous, true "wooden-horse" escape by three British soldiers from a German POW camp and their dramatic adventures making their way back to England.

Spy Catcher by Oresto Pinto (Berkley, 35¢)—Factual story of counter-intelligence in World War II by man responsible for apprehending and executing seven spies.

The Man with Three Faces by Heins-Otto Meissner (Ace, 35¢)—The almost unbelievable tale of Richard Sorge, German journalist who worked for Russia as a Communist spy in Japan before and during World War II and the fantastic activities of the spy ring he established there.

The Counterfeit Traitor by Alexander Klein (Permabooks, 35¢)—The amazing account of Swede Eric Erickson, who turned Nazi to act as an allied spy. True story of drama, intrigue, espionage.

A Man Escaped by Andre Devigny (Berkley, 50¢)—The unique, dramatic escape of a French political prisoner from Nazi-guarded fortress of Montluc, in Lyons, France, during World War II.

You and the Universe by N. J. Berrill (Premier, 50¢)—The exploration of man's place and role in the expanding universe.

Berlin by Theodore Pliever (Ace, 50¢)—A story about the beleaguered, war-torn city.

The Night Hamburg Died by Martin Caidin (Ballantine, 50¢)—A grip-

(Continued on page 131)

September 1960

10th Annual

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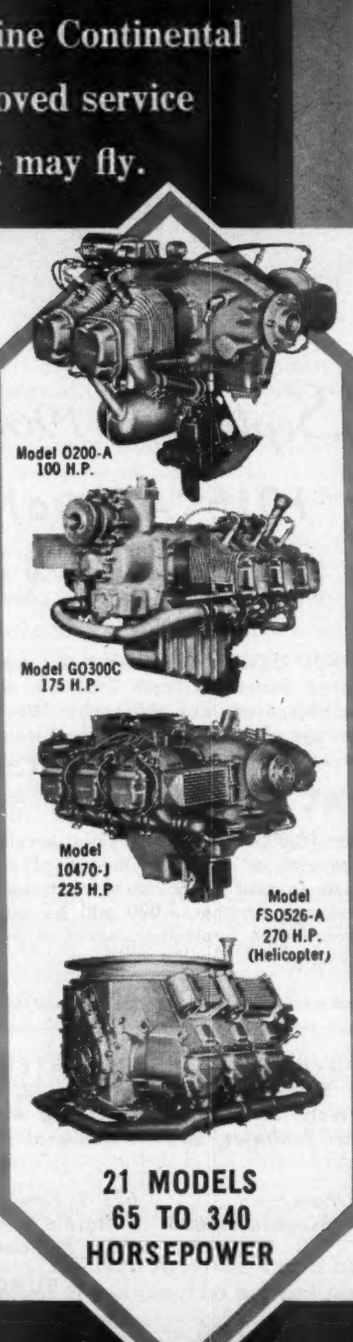

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Tin Cans: The Story of the Fighting Destroyers of World War II by Theodore Roscoe (Bantam, 50¢).

The Coast Watchers by Cmdr. Eric A. Feldt, R. A. N. (Ballantine, 50¢)—Story of small groups of men who lived on Japanese-held islands in the Southwest Pacific and obtained intelligence for allied forces.

Masters of Deceit by J. Edgar Hoover (Pocket Books, 50¢)—Penetrating study and expose of the Communist Party in the US.

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The Memoirs of Field Marshal Montgomery (New American Library, 75¢)—Candid views of the man who commanded British armies in Europe and led allied ground forces during the invasion of Europe.

Reading for Dollars and Sense by William D. Sheldon and Leonard S. Braam (Syracuse Univ. Press, $1.75)—An effective guide to improving reading efficiency. A digest of a highly successful reading improvement course conducted by the authors.

Strategy by B. H. Liddell Hart (Praeger, $1.75)—Reprint of this well known military study.

Strategy for Survival by Wayland H. Young (Penguin, 65¢)—Study of atomic weapons and warfare and proposals for nuclear disarmament.

Common Sense and Nuclear Warfare by Bertrand Russell (Simon and Schuster, $1)—Impassioned plea for rational approach in solving problems of peace and war.

The Open Mind by J. Robert Oppenhiemer (Simon and Schuster, $1)—Discussion of atomic weapons and the relation between science and culture.

Why NATO? by Paul Henri Spaak (Penguin, 25¢)—Events and ideas which lead to the creation of NATO.

Guadalcanal Diary by Richard Tregaskis (Popular Library, 35¢)—Reprint of this World War II classic.

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$5000	$5250	$5500	$5750	$6000	$6250
$7500	$7875	$8250	$8625	$9000	$9375
$10,000	$10,500	$11,000	$11,500	$12,000	$12,500
$15,000	$15,750	$16,500	$17,250	$18,000	$18,750
$20,000	$21,000	$22,000	$23,000	$24,000	$25,000
$25,000	$26,250	$27,500	$28,750	$30,000	$31,250
$50,000	$52,500	$55,000	$57,500	$60,000	$62,500

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5,000	☐ 7.50	☐ 10.00
7,500	☐ 11.25	☐ 15.00
10,000	☐ 15.00	☐ 20.00
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20,000	☐ 30.00	☐ 40.00
25,000	☐ 37.50	☐ 50.00
50,000	☐ 75.00	☐ 100.00

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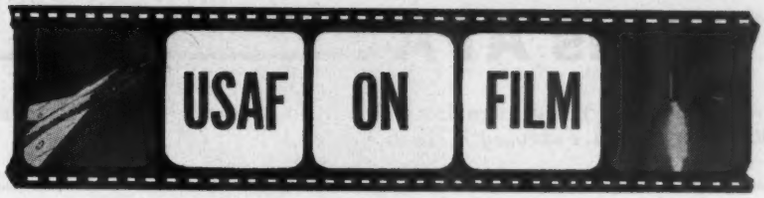

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These and other selected USAF films are available for loan from the Air Force Film Library Center, 8900 South Broadway, St. Louis 25, Mo. Requests, which are welcomed from both military and civilian groups, should contain Air Force serial numbers and correct titles to avoid delay in processing. Because of heavy demands for certain films, particularly those on missiles and space, the Film Library Center recommends that requests indicate both alternate films as well as showing date.

AFNR 52—Air Force News Review No. 52—The President at Canaveral; The Thunderbirds Over Formosa.

AFNR 53—Air Force News Review No. 53—Pioneer V; The Mercury Astronauts.

SFP 608—The Air Force Missile Mission—Actor James Stewart, a reserve brigadier general, discusses USAF today.

SFP 263—The Air Force Story, Vol. II, Chapter 4—Korea, the Final Phase.

TF 1-5271a—Ditching Techniques for Transport Aircraft—Steps to minimize hazards of ditching when a forced landing is anticipated at sea.

SFP 674—Rocket Club—The exciting and educational story of a youthful rocket builder.

AFSM 580—I & E Screen Magazine No. 580—Champion football highlights of 1959 and 1960.

SFP 1001—Mission—Sonic Boom—A story that treats the "sound of security."

TF 1-5329—Maintenance and Management of USAF Vehicles—USAF's vehicle maintenance program.

SFP 620—The Air Reserve Forces—The Air Force Reserve and the Air National Guard, the two elements of the reserve forces are examined on film.—END

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Caravan	$18-22	$18-22		
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Holiday	$20	$20	$30-50	
Mart	$7-9	$8-14	$16-24	
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• To assist in obtaining and maintaining adequate airpower for national security and world peace. • To keep the AFA members and the public abreast of developments in the field of aviation.

• To preserve and foster the spirit of fellowship among former and present personnel of the United States Air Force.

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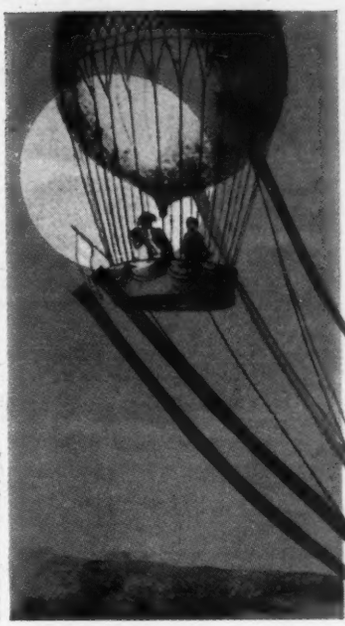
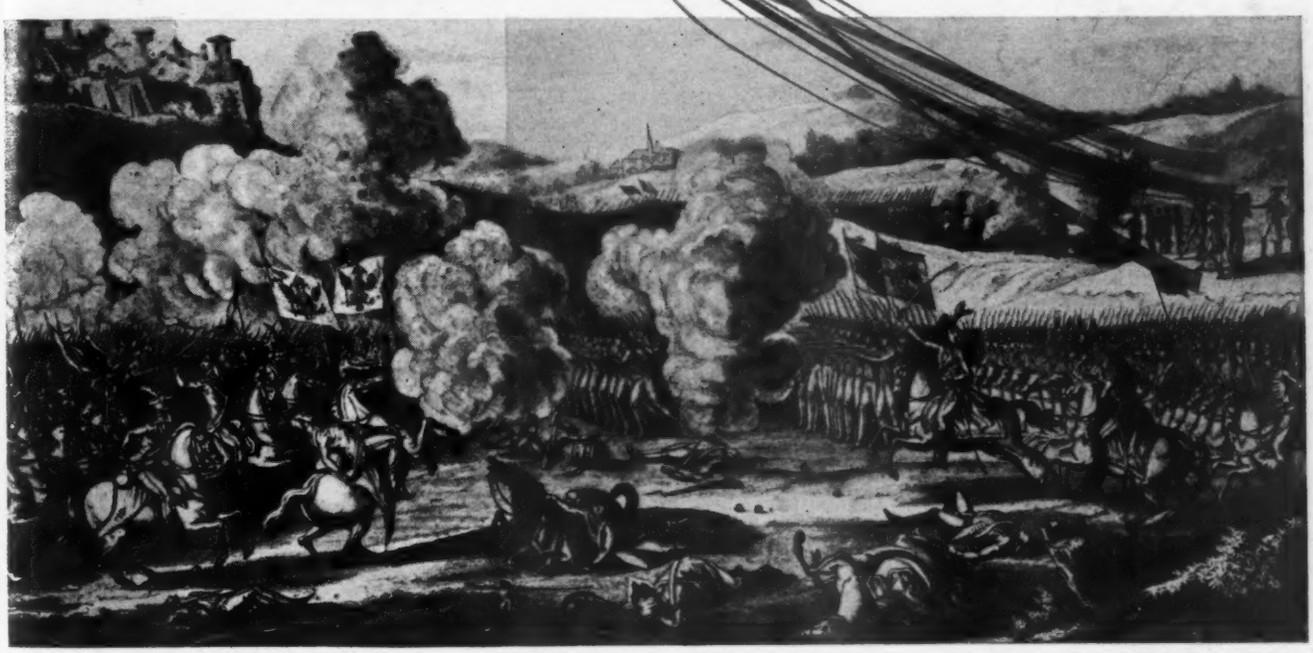


One of a series depicting historic incidents in military communications

National guard forces under Gen. Jourdan
decisively defeated the Austrian Army of
the Prince of Saxe-Coburg at Fleurus, June 26, 1794,
saving Paris and the French Revolution.
A decisive factor was the use of balloons
and a system of signals to communicate with the ground.
Airborne data link permitted the French
to swiftly counter enemy moves.

AIRBORNE INPUT — 1794



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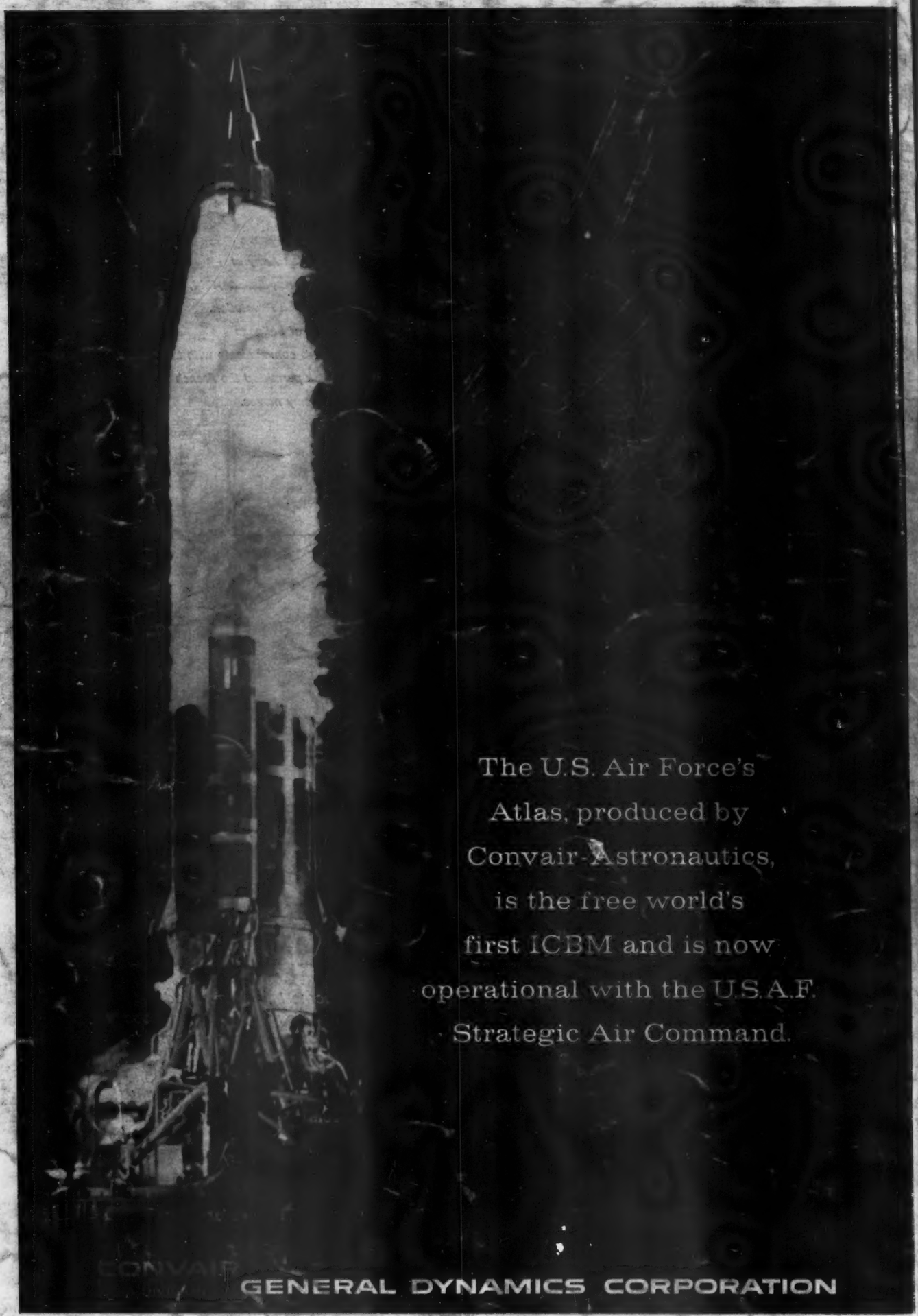
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